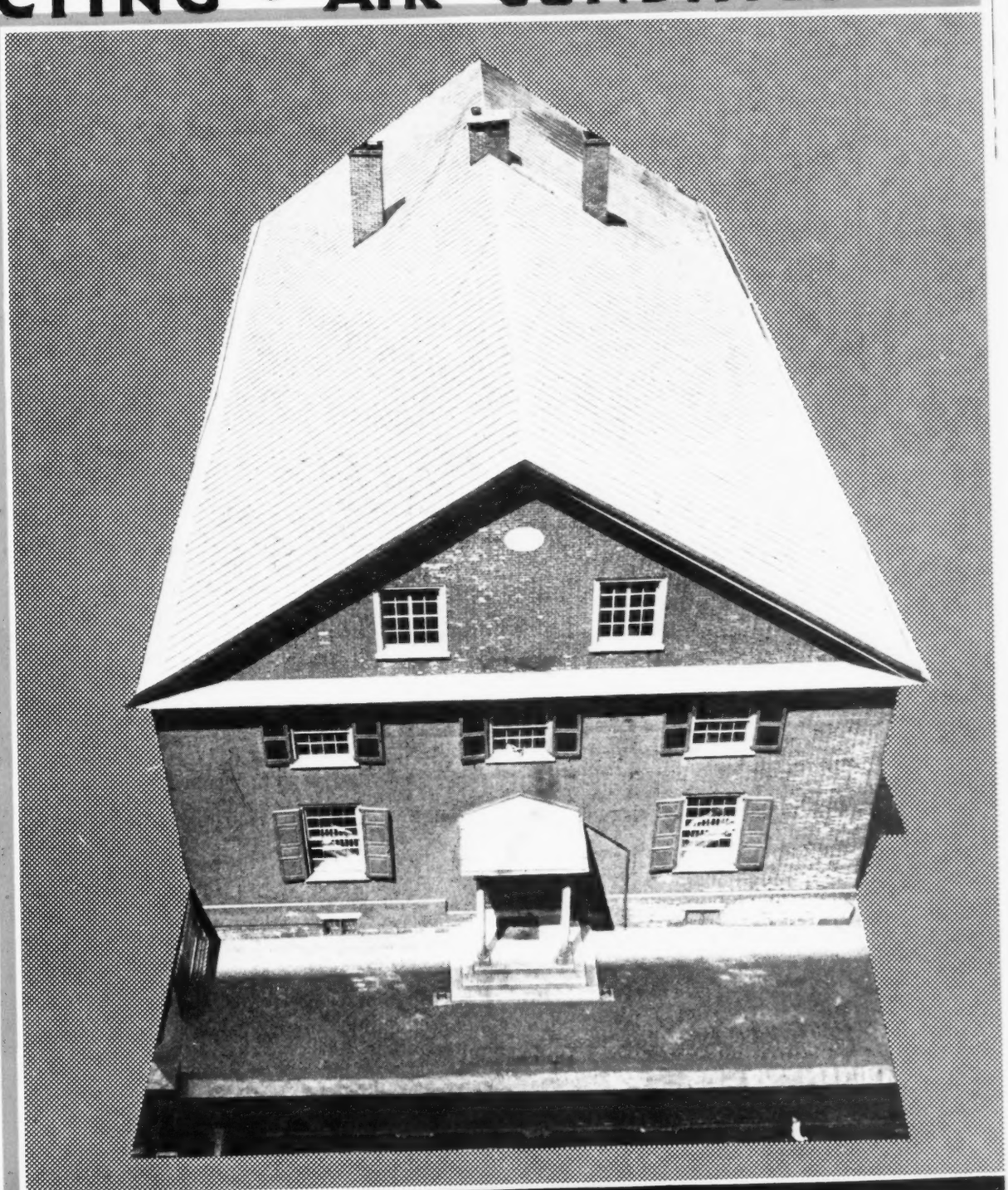
AMERICAN ARTISAN

ARM AIR HEATING • SHEET METAL
ONTRACTING • AIR CONDITIONING



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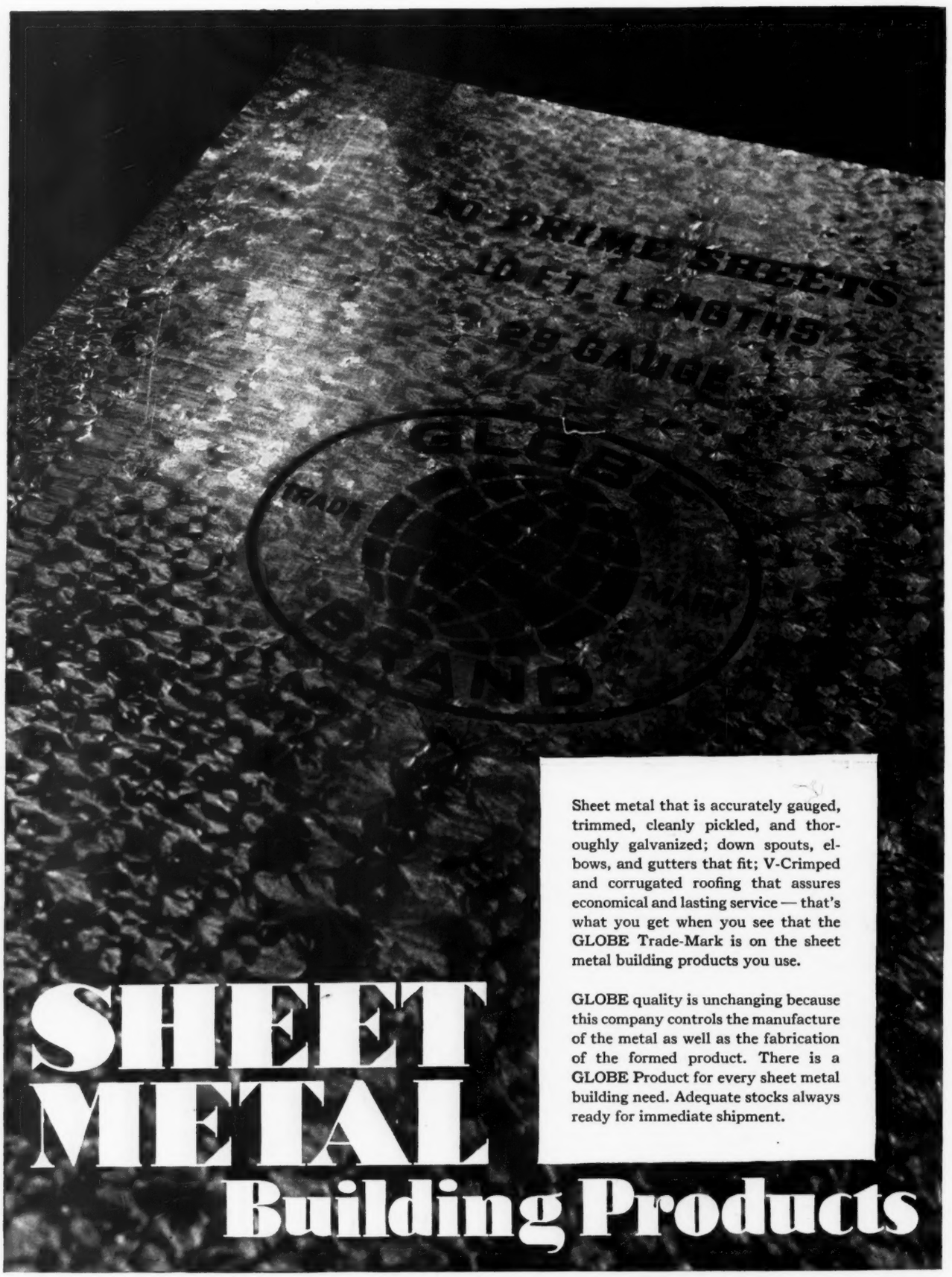


Sheet metal that is accurately gauged, trimmed, cleanly pickled, and thoroughly galvanized; down spouts, elbows, and gutters that fit; V-Crimped and corrugated roofing that assures economical and lasting service — that's what you get when you see that the GLOBE Trade-Mark is on the sheet metal building products you use.

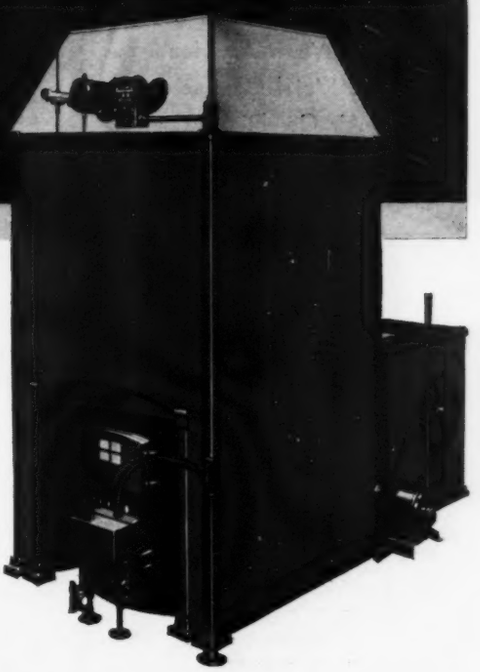
GLOBE quality is unchanging because this company controls the manufacture of the metal as well as the fabrication of the formed product. There is a GLOBE Product for every sheet metal building need. Adequate stocks always ready for immediate shipment.

The Globe Iron Roofing & Corrugating Company
Cincinnati, Ohio

Fabricators of Zinc Institute—Seal of Quality—Two Ounce Coated Galvanized Corrugated Roofing

QUICK SALES . . . IMMEDIATE PROFITS

with the Famous MW Line of Oil-Burning Utilities, giving dealers attractive merchandise to sell throughout all seasons of the year



Just count, in your own community, the home owners whose warm-air heating plants have reached the replacement stage. Their number is greater than in any previous year, and they alone represent *a huge market.*

Practically every one of these owners can be made a prospect for the famous MW *"Automatic Weather Control Unit."* They are interested because the MW "Automatic Weather Control Unit" is so much more than a heating plant, because it does year-round, double duty, because it makes the best possible, most economical job of *heating and air-conditioning* the premises in Winter—and in Summer reverses its functions, by keeping rooms supplied with *cool, invigorating, force-circulated air,* at trifling cost.

For homes equipped for steam or hot water heating, the MW line offers a series of *Boiler Units* of radically improved design, unrivalled in heating efficiency, marvels of fuel economy.

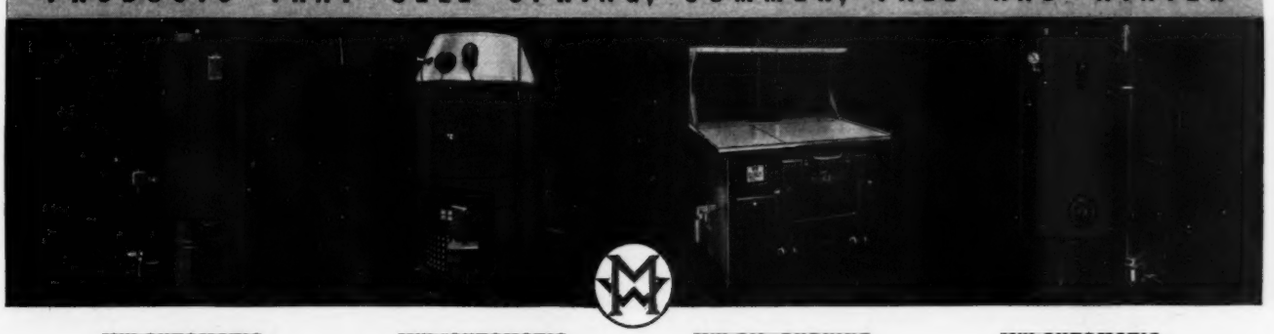
And there are MW *Automatic Water Heaters* in domestic and commercial sizes, and large and small *Oil-Burning Ranges* for homes, restaurants, lunch rooms, roadside stands, hotels, clubs and many other locations.

For dealers, the MW line is an *attractive proposition* because it includes highest-quality, nationally advertised merchandise for Spring, Summer, Fall and Winter selling. The MW *Franchise,* too, is attractive, because it is purposely designed to meet present-day conditions and to safeguard satisfactory profits to dealers. The coupon below will bring full information.

MW

OIL-BURNING • AUTOMATIC WEATHER CONTROL UNITS

PRODUCTS THAT SELL SPRING, SUMMER, FALL AND WINTER



MW AUTOMATIC WATER HEATERS

Domestic and commercial sizes. For houses, apartments, office buildings, schools, shops, factories. Single and battery installations. Hot water at lowest cost. Listed as Standard by Underwriters' Laboratories.

MW "AUTOMATIC WEATHER CONTROL UNITS"

Round and square types. Warms in Winter, cools in Summer—automatically. Low cost and economical upkeep. Most popular air-conditioning units on the market. Listed as Standard by Underwriters' Laboratories.

MW OIL-BURNING COOKING RANGES

Two types—for homes, restaurants, lunch rooms, roadside stands, hotels, clubs, etc. Quick, clean, uniform, controlled, oil-generated heat—the better, more economical way of cooking, frying, roasting, baking.

MW AUTOMATIC BOILER UNITS

Heating with steam or hot water. Revolutionary burner and tube construction assures most complete heat utilization ever achieved. Small and large capacities.—Listed as Standard by Underwriters' Laboratories.

SEND THIS COUPON

MOTOR WHEEL CORPORATION, *Heater Division,* LANSING, MICH., Dept. A-9

Please send me full information regarding the MW line of oil-burning utilities, and explaining its sales and profit opportunities.

*Name*_____ *Address*_____ *City*_____ *State*_____

Covering All Activities
in
Gravity Warm Air Heating
Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Merchandising
Ventilating

AMERICAN ARTISAN

Founded 1880

VOL. 101 ▼ No. 15

SEPTEMBER, 1932

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Entered as second-class matter, July 29, 1932, at the Post office at Chicago, Illinois, under the act of March 3, 1879. Formerly entered on June 25, 1887, as American Artisan and Hardware Record

To combat corrosion the Allbright-Nell Co. use Inland Copper-Alloy Sheets for packing house equipment. Paunch truck and sausage meat truck are shown here.
Tests by the American Society for Testing Materials have settled one question — that copper-bearing steel sheets outlast non-copper-bearing iron or steel sheets under actual atmospheric conditions.
Long Life.....Low Cost
INLAND
COPPER ALLOY
STEEL

Combine Them to Revive Sales

COMPELLING sales appeals are needed in these hesitant times. Low cost and long life — always powerful — now have even stronger appeal. And, fortunately, you can combine them by using Inland Copper-Alloy Steel.

Authorities agree that copper-bearing steel endures longer under corrosion. Costing a very little more than ordinary commercial grades of steel — and much less than any other corrosion-resisting material, copper-bearing steel is *one best* product which costs the least.

Made in sheets, strip, structurals, any Inland steel product, Inland Copper-Alloy Steel is the logical material for any product coming in contact with moist air. INLAND STEEL COMPANY, 38 South Dearborn St., Chicago.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Plates
Bands Structurals Piling

Rails Track Accessories
Bars Rivets Billets

THE FOX FURNACE COMPANY

Announces the

SERIES No. 10

SUNBEAM

AIR CONDITIONING UNIT

at the amazingly low price of

$153.75 F.O.B. ELYRIA OHIO

22" firepot; 98,000 B. T. U. capacity at register; comparable capacity in leader pipe area is 715 square inches.

Prices of other sizes in proportion.

The change in residential heating, which economists, statesmen, editors, financial and industrial leaders have predicted would follow the introduction of the Air Conditioning System at a popular price, is now ready to take place.

The introduction of the new Sunbeam, Series No. 10, at its amazingly low price, finally brings to a realization all these forecasts. For with this announcement, virtually everyone can afford residential Air Conditioning, about which they have been hearing and reading so much. Virtually every home owner replacing a worn out furnace this fall is an excellent prospect. Everyone building a home—realty companies, speculative builders, contractors, architects—can now afford modern Sunbeam Air Conditioning.

STANDARD EQUIPMENT

Each Series No. 10, SUNBEAM Air Conditioning Unit, comes equipped as follows:

1. 1000 Series cast iron furnace with vapor pan;
2. Round galvanized casing with flat top hood;
3. Special inner casing;
4. Blower and filter compartment;
5. American Blower Corporation "Sirocco" blower, 12" double wheel;
6. General Electric Motor, 1/4 H. P;
7. Belt and pulleys;
8. Mercoid M-53 Blower Switch;
9. BX wire from blower control to blower motor, with outlet box and fittings;
10. American Filter Company filters.

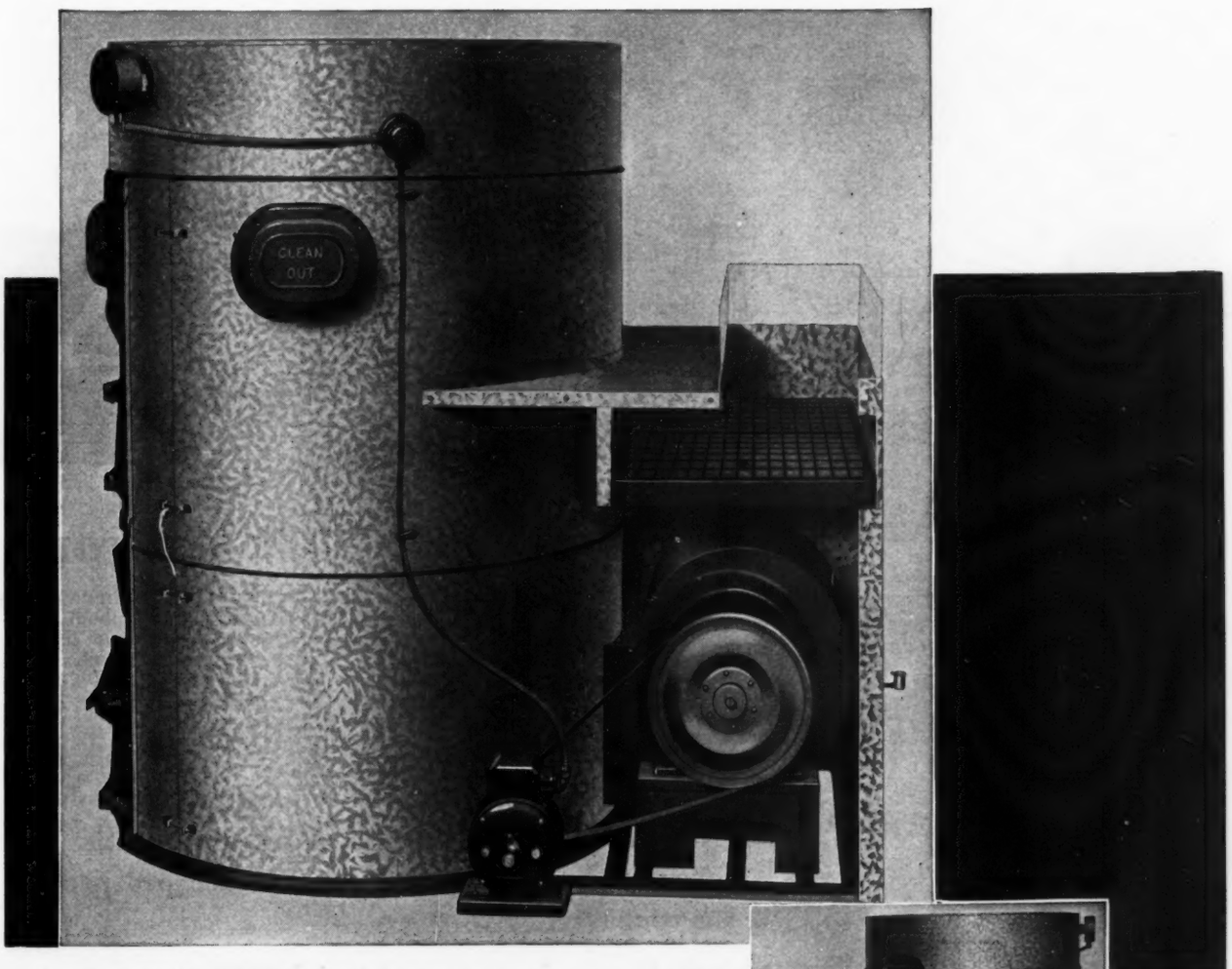
Temperature control equipment and automatic humidifiers are also available. Prices furnished on request.

Be the first heating contractor in your community to offer residential Air Conditioning for the millions of homes that can now afford the Sunbeam! Be the leader in this new development and reap the profits of leadership. Immediate shipments can be made. Prompt, capable layout and engineering service is available to Sunbeam dealers. Literature to promote sales is ready for your use. You can profit from this announcement, NOW, this Fall, this month, this week. Wire today for complete details, or return the coupon.

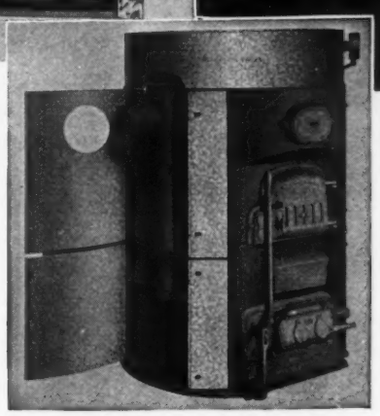
THE FOX FURNACE COMPANY, ELYRIA, OHIO

A Division of

AMERICAN RADIATOR & STANDARD SANITARY CORPORATION



The SUNBEAM Air Conditioning Unit, Series No. 10. This view shows the thick, efficient American filters at the base of the recirculating air duct; the silent, powerful Sirocco Blower; the General Electric blower motor. The heating element is the 1000 Series Sunbeam Furnace, with one piece radiator; feed section and ash pit that extend through front of furnace; heavy castings; deep, clean cut joints; duplex grates or triangular grate bars.



The inner casing, shown at the right, is scientifically proportioned so that proper pressure is obtained and the air is distributed evenly over all heat radiating surfaces. Opening between inner and outer casings is sealed at top and bottom, making a dead air space.

RETURN THIS COUPON TODAY

THE FOX FURNACE COMPANY
ELYRIA, OHIO

We feel that the sales possibilities of a COMPLETE, high quality, Air Conditioning Unit like the Sunbeam, are unlimited. Please rush detailed information and the amazingly low prices on all sizes.

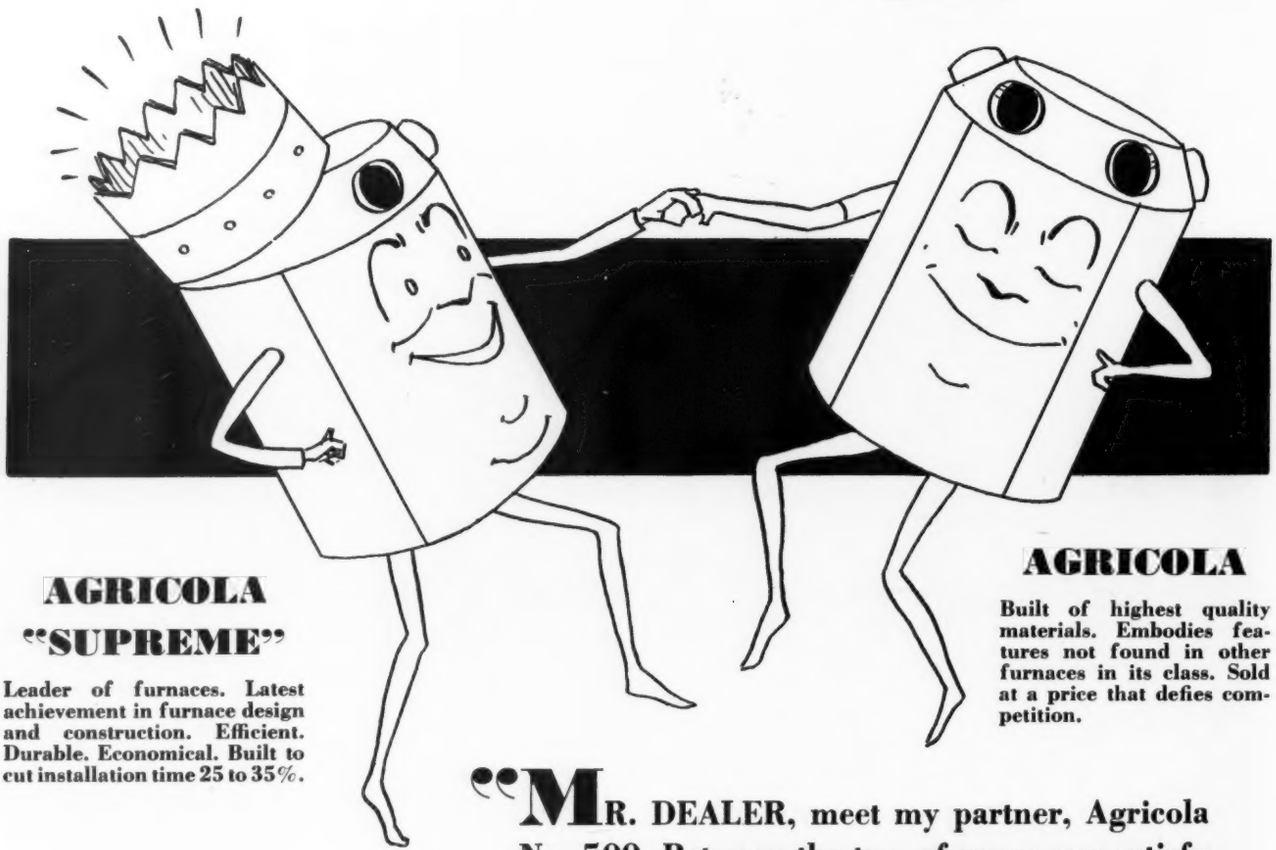
Name_____

Address_____

City and State_____

AA-1

. . . Get acquainted with *this* Happy Pair



AGRICOLA
"SUPREME"

Leader of furnaces. Latest achievement in furnace design and construction. Efficient. Durable. Economical. Built to cut installation time 25 to 35%.

AGRICOLA

Built of highest quality materials. Embodies features not found in other furnaces in its class. Sold at a price that defies competition.

"MR. DEALER, meet my partner, Agricola No. 500. Between the two of us we can satisfy every requirement of every furnace prospect in your territory.

"We're ready to do a big job! Why not give us a chance to make good for you, just as we are doing for dealers in other territories.

"Get in touch with me now for the complete Agricola story."

AGRICOLA "Supreme"
LEADER OF FURNACES

"FURNACE WARMTH FROM THE SUNNY SOUTH"

AGRICOLA FURNACE COMPANY, INC.
GADSDEN, ALABAMA
Offices in Principal Cities

"I'm using copper on more of my jobs this year than ever before"

"It is my experience that most people, like yourself, are willing to pay for copper when they understand its advantages"

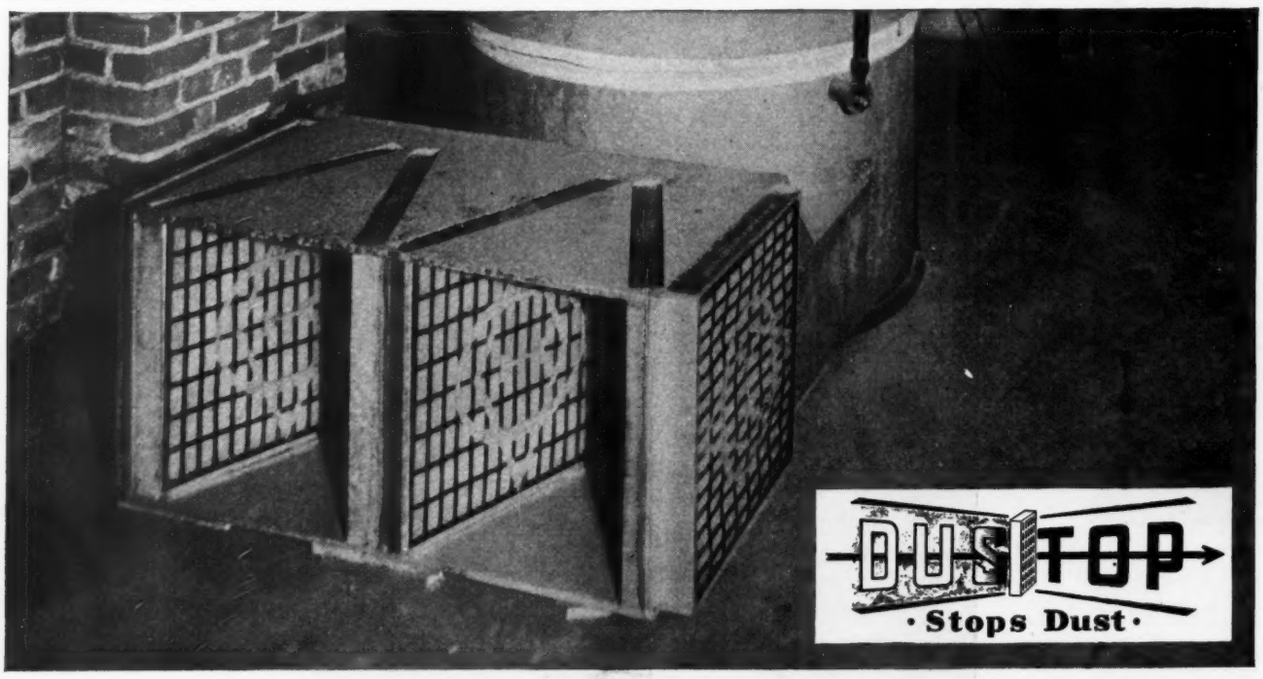
ANACONDA
from mine to consumer

BY EXPLAINING that copper is the most economical metal to use, many contractors today are securing sheet metal business *at a satisfactory profit.* For most home-owners will pay a fair price for copper, when they appreciate its advantages... and when they realize that, for a 7-room house, copper gutters and rainpipes cost them only about $35 (national average) more than rustable metal.

Leading sheet metal supply houses carry Anaconda Copper, the accepted standard of sheet metal quality that is *easier to sell,* because it is backed by industry's best known name... in sheets, rolls and Economy strips, and copper gutters, leaders, elbows and shoes trade-marked ANACONDA. The American Brass Company, Waterbury, Connecticut.

ANACONDA COPPER

8,500,000 PROSPECTS
and profit in every job



A typical installation of DUSTOP filter units on a standard type of warm air furnace.

● Dust and dirt circulating from 8,500,000 furnaces! 8,500,000 gravity warm air furnaces just waiting for aggressive dealers to install gravity filters!

It's your job to make dirty furnaces clean. You can do this job at a profit—with DUSTOP.

DUSTOP retails to the householder at $1.50. This low figure enables you to use as many of them as are necessary to do an effective job.

Dust is one of the gravest concerns of the modern housewife. There's a smooth selling approach for you. Tell housewives that you can stop furnaces from spreading dust and dirt and you'll get into as many basements as the meter man.

DUSTOP filters will live a whole heating season and more. DUSTOP is the only filter that will do a real job of cleaning on low velocities —as low as 25 feet per minute. And average velocities will run around 140 feet per minute on a moderately cold day.

The new DUSTOP glass wool filter offers furnace dealers a fine opportunity to build up a volume of profitable business.

For more detailed information mail the coupon today. You will receive a booklet giving complete information on DUSTOP installation both for gravity furnaces and for the revamping of gravity jobs for mechanical circulation of filtered and heated air. Owens-Illinois Glass Company, Toledo, Ohio.

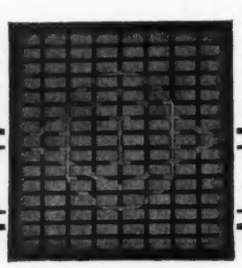
Owens-Illinois Glass Company (Industrial Materials Division)
Toledo, Ohio
Please send me your booklet "Jobs To Do at a Profit."

*Name*_____

*Address*_____

_____

Furnace filters for gravity and mechanical warm air furnaces



distributed through jobbers and manufacturers everywhere.

OWENS-ILLINOIS AIR FILTERS

Boston Contractor uses REVERE SHEET COPPER *for Important Jobs*

Dunster House, Harvard University... Hetty Green Hall, Wellesley College... these are among the more important jobs for which John Farquhar's Sons Co., South Boston, was Sheet Metal Contractor.

Approximately 43,500 pounds of this material went into the first building...over 10,000 into the second.

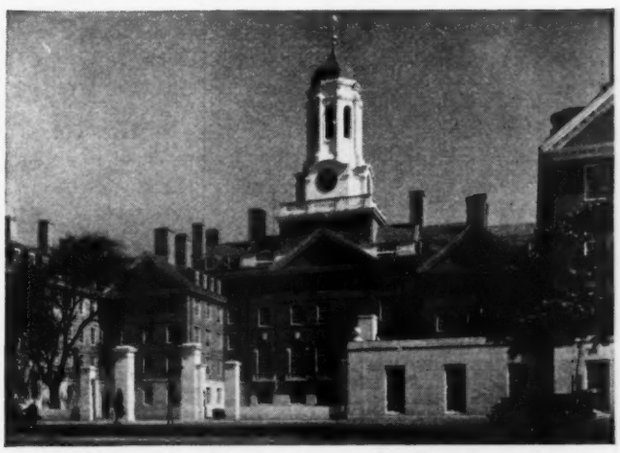
Revere Sheet Copper has a 130-year reputation for quality, workability, permanence, economy. Splendid background for Farquhar's fine workmanship.

✣ ✣ ✣

Revere prestige (built up by jobs like the above) has created a real preference for Revere products... something you should capitalize on. You should also make capital out of the customer-satisfaction which always results from the use of the finest quality materials... such as Revere products are.

So, you see, the Sheet Metal Contractor who uses Revere products has a decided sales advantage. You owe it to yourself to get and keep this advantage.

For further information, address Revere Copper and Brass Incorporated, 230 Park Ave., N. Y. C.



Dunster House, Harvard University. Architect: Coolidge, Shepley Bulfinch and Abbott, Boston.

Hetty Green Hall, Wellesley College. Architect: Charles Z. Klauder, Philadelphia.

Revere Copper *and* Brass

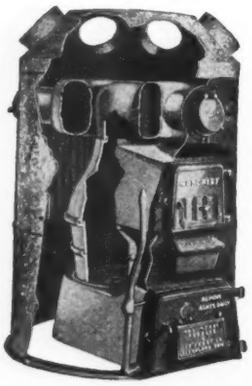
INCORPORATED

Revere COPPER BRASS Products

Baltimore *Division, Baltimore, Md.* Michigan *Division, Detroit, Mich.* Higgins *Division, Detroit, Mich.*
Dallas *Division, Chicago, Ill.* Taunton-New Bedford *Division, Taunton, Mass.* Rome *Division, Rome, N. Y.*

EXECUTIVE OFFICES: NEW YORK CITY
GENERAL OFFICES: ROME, N. Y.

Moncrief Dealers Enjoy All the Advantages



Cutaway view of the Series "C" Cast Furnace

Cutaway view of the Series "S" Steel Furnace

Every opportunity for making money and building a substantial business is had by the Moncrief dealer. He is able to beat competition at every turn.—The Moncrief line is high grade in all respects, but not high priced. It is most complete, including several series each in cast and steel furnaces, in a full line of sizes.—The new Moncrief Gas Furnaces have made great records for economy. Two models—full automatic with all devices for air conditioning; and manual controlled. They open up a big profit field.

Send now for particulars of the Moncrief proposition

The Henry Furnace & Foundry Co.
3471 E. 49th St. **Cleveland, Ohio**

Branches at
Pittsburgh, Pa. and Ashtabula, Ohio

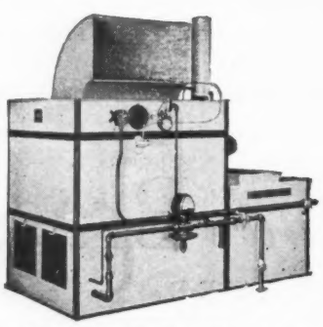
Eastern Office
2134 Market St., Philadelphia, Pa. E. L. Garner, Mgr.

Pacific Coast Representative
McPherson Furnace & Equipment Co., Seattle, Washington

Moncrief Pipe and Fittings

We operate one of the largest and finest sheet metal plants in the country and supply the trade with everything used on a warm air heating job.

MONCRIEF FURNACES



Moncrief Air Conditioning Gas Furnace

Distributors:

Chicago Furnace Supply Co., Chicago, Ill.
Moncrief Furnace Co., Indianapolis, Ind.
The F. H. Lawson Co., Cincinnati, Ohio.
Johnson Furnace Co., Kansas City, Mo.
E. A. Higgins Co., Omaha, Nebr.
J. M. & L. A. Osborn Co., Buffalo, N. Y., and Detroit, Mich.
Geo. H. Cole Supply Co., Troy, N. Y.
W. H. Landers Co., Syracuse, N. Y.
Springfield Plumbing Supply Co., Springfield, Mass.
Sheet Metal Supply Co., Milwaukee, Wis.
Northern Metal & Mfg. Co., Green Bay, Wis.
Schrader-Easley Co., Memphis, Tenn.
Marshall-Wells Co., Duluth, Minn.
Rhodes Mfg. Co., Grand Rapids, Mich.
Moncrief Heating Co., South Bend, Ind.
Moncrief Heating Co., Youngstown, Ohio.

"Give me the cheapest you have"

INSTRUCT YOUR SALESMEN *always to mention the familiar Armco triangle and what it stands for: twenty-six years of rust-resisting, low-cost service.*

INGOT IRON SHOP NEWS

Frameless Metal-House Now Being Constructed May Open New Field For All Sheet Metal Men

Metal Plays Major Part In Keeping Bakery Clean

BETTER SELLING

READ "INGOT IRON SHOP NEWS" every month for ideas and suggestions on how to stimulate sales, cut costs, and turn out better work. Published by the Armco Distributors Association, this valuable business-building paper is free to anyone concerned with sheet metal work. Write us if you want to get it regularly.

WHEN THE CUSTOMER SAYS, "I want this job done as cheaply as possible," you might proceed along these lines:

"Well, Mr. Prospect, I can use cheap materials on this job, but before doing so I want to be sure you understand that that does not mean economy.

"I know you don't expect me to do the job without profit, and although I can use cheap materials and give you a price as low as any of my competitors, you won't be satisfied, and neither will you save money.

"The labor cost is no higher when I use good materials, and the material cost is only a very little higher. With only a small additional investment you are assured a job that will give long, trouble-free service without the annoyance of early repairs, and the inconvenience and expense that frequently result when inferior materials are used."

Every sheet metal contractor knows that repeat business comes from satisfied customers. Only quality work with quality materials insures the satisfaction of *your* customers.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices: **Middletown, Ohio**

Distributors in the principal cities of the United States and Canada

PROFITS COME WITH BETTER SELLING

ARMCO PRODUCTS

Help you sell

GUY C. SMITH

Manager of Advertising and Research

Libby, McNeill & Libby

"Any American advertising manager who wants to learn the value of the Audit Bureau of Circulations need only start buying newspaper space in foreign countries. The impossibility of knowing accurately, without special and costly research, the amount and breakdown of circulation of publications in any other country, is a sharp contrast to the information which has become available to advertising in this country by reason of the work of the A. B. C.

"But the Bureau needs the support of every important user of publication space. In my opinion it has not begun to reach any limit of its usefulness. I consider it one of the most fundamental advertising expenditures our company makes."

Guy C. Smith

BERNARD LICHTENBERG

***Vice President*, Alexander Hamilton Institute**

"Buying advertising space in newspapers and periodicals without referring to A. B. C. circulation audits is like buying a pig in a poke. The old time farmers never traded horses blind.

"The earnest attempt on the part of such organizations as the Incorporated Society of British Advertisers, the Australian Association of National Advertisers, the German Reklame-Schutzverband, and the Mexican Asociacion de Annunciantes, among others, to form an Audit Bureau in their countries based on our own A. B. C., is an indication of the fact that thoughtful advertisers around the world have seen the worth of such an organization."

Bernard Lichtenberg

● Twenty years ago there was chaos in advertising. Nobody knew what his dollars bought—whether a thousand readers or ten thousand. Nobody, except by infinite pains and shrewdness, could find out.

Could advertising, on that basis, ever have grown to its present importance? Would business ever have rested its trust in a sales weapon of metal so doubtful in assay?

Hardly, think men who today direct advertising expenditures that total millions. Through such leaders as these the Audit Bureau of Circulations came to be organized. And largely through the activities of the Bureau, there is order today in the buying of advertising space.

Once a year now, into almost every important publication office, go the auditors of the A. B. C. Every circulation record is open to them.

To no publisher, no agency are they responsible. They work directly for the Audit Bureau of Circulations, and on the directorate of this institution a majority must be advertisers.

The Bureau's Audit Reports thus give the detailed findings of experts controlled by advertisers. They bring to light the complete circulation facts.

Can any budget yield full returns without use of this only recognized method of appraising advertising space?

Can any important advertiser, whether national or local, afford to be unrepresented upon the membership roster of the Audit Bureau of Circulations?

An Advertisement by the
AUDIT BUREAU OF CIRCULATIONS
Executive Offices • • • Chicago

HARVEST "MUSIC"!

The "Thump" of Corn on the "Bump Boards" and the Roar of the Tinner's Fire Pot!

THRESHING is almost over. Not yet—but soon—all over the great "Corn Belt" will be heard the thump—thump—thump as the husked ears hit the "bump boards" while a monster corn crop is being gathered.

"Harvest Music"—yes!—but so is the roar of a tinner's fire pot—especially if you happen to be a tinner and not a farmer!

And it is Harvest Time for BOTH. Downspouts and gutters MUST be repaired and replaced for winter; furnaces that struggled through last winter MUST be replaced by somebody — maybe YOU — and others are still to be cleaned and repaired (people just INSIST on refusing to "take stitches in time"!).

YOU must help—and you must tell your probable customers that you CAN help. Run "ads" in your local papers; get on the phone; and—best of all!—go from house to house pointing out obvious work needed and telling householders what YOU can do. If you do these things, business will surely "pick up" for you in the coming weeks.

All we ask is that, wherever possible, you use HANDY PIPE!

F. MEYER & BRO. CO.

1311-13 S. ADAMS ST. PEORIA, ILL.

OUR PRICES ARE DOWN—BUT NOT OUR QUALITY

fact or fancy

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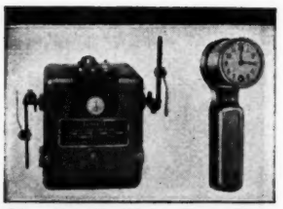

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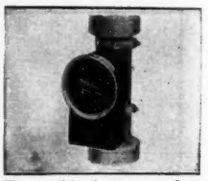

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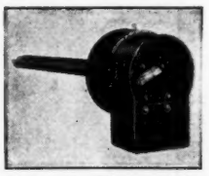

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VOLUME 101 AMERICAN ARTISAN NUMBER 15

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

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While this sentiment was at its height we had doctors who specialized in tonsils or headaches; lawyers who were specialists in defending husband killers, or passing on corporate bond issues; dentists who did only extraction; and in our own field, strictly gravity installers, forced air specialists, ventilation experts or roofers who refused to do any other type of work.

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In our fields we see the ventilation man working into heating, air conditioning, and sheet metal; forced air specialists soliciting residential sheet metal work; roofers doing furnace repairs and general sheet metal contracting.

The principal factor which has brought about this change is the need for sales.

So long as times were good men could afford to pick and reject from general work and do only that type of work which afforded the most interest or paid the largest profit. Under present conditions there is seldom enough work of any one kind to keep the specialist busy and of equal importance the public has become surfeited with high priced specialists and wants the most service and the widest application of information for the least money. Furthermore, the public is willing to spend time and effort to look around and get exactly this kind of service.

Some operators in the sheet metal and heating fields profess to see in this trend detrimental consequences. Mostly they profess to see a general lowering of fees or prices as men and firms which are not aware of all the pitfalls of some specialty field contract to do work outside their last ten year's field of operation.

To hold such an opinion in the face of this very evident trend is probably a waste of time and effort. Old timers say that under conditions such as exist today these trends work out their course regardless of any one man's personal ideas or efforts.

Furthermore, this trend from specialist to all around efficiency can very well be regarded as a move toward more uniformity of operations. Proof of this can be seen in the development program of our largest industries who right now are developing products which certainly do not fall within the scope of activities upon which these industries were founded. Further proof can be found in the individual who in 1927 was a drill press specialist, but who now can and willingly does any machine work. Even the farmer, who a few years ago became a hog or a wheat specialist, today looks to diversification as the only way to beat weather, nature and the market.

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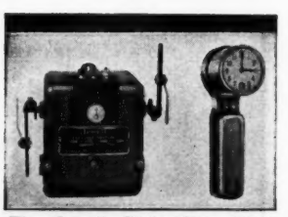

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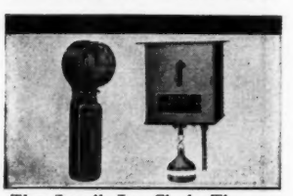

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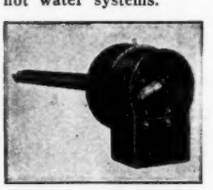

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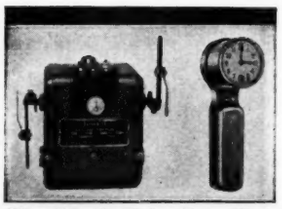

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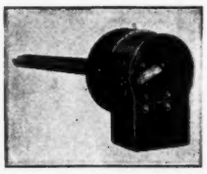

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Tentative Code for Installation of Mechanical Warm Air Furnace Heating Systems in Homes

Compiled by the Joint Code Committee and the Code Committee of the Furnace Blower Manufacturers Association

Intent of the Code:

These tentative rules are submitted with the idea of expressing their provisions in such form that they may be understood and applied by anyone. They are intended to serve until such time as a final and more precise code for mechanical warm air furnace heating is evolved.

ARTICLE 1

Definitions

Section 1. Forced or mechanical warm-air heating systems to which these rules refer, shall consist of one or more warm air furnaces within individual casings or within one common casing, one or more motor driven blowers, smoke or vent pipes, individual leader pipes or trunk line systems with necessary control dampers for supply and return air, registers, faces and grilles; and with provision for other appurtenances such as filters, air washers, ozonators, humidifiers, etc., as may be desired; furthermore, manual or automatic controls for any or all apparatus installed.

Section 2. An individual duct system for either warm or cold air shall consist of separate pipes of round or rectangular cross section, each style to be of the same equivalent size throughout its full length and without branches, extending to or from the heating unit.

Section 3. A trunk line system for either warm or return air shall consist of one or more main ducts extending outward from the heating unit, with one or more branch ducts from each main duct to the rooms or parts of the building being served.

ARTICLE 2

Calculations

Section 1. Determination of the Basic Factor for Each Room and for the House.

(a) Divide square feet of exposed glass surface by 12. (Note 1.)

(b) Divide square feet of net exposed wall surface, cold ceiling or cold floor, by factor in Table A of Standard (Gravity) Code. (Note 2.) For Table A, see page 7.

(c) Divide cubic contents of room by 800. (Note 3.)

(d) Add the results of (a), (b), and (c). The above rules are for 70 degrees temperature difference (outside temperature zero, inside temperature 70 degrees Fahr.). When temperature difference is more than 70 degrees, add 1.5% per degree to the above sum. When temperature difference is less than 70 degrees, deduct 1.5% per degree from the above sum. For rooms having unusual exposure, (ordinarily north, northeast and northwest) add 15% to the sum of the above quotients.

(e) The result obtained from (d) for each room is the **room basic factor,** to be applied later.

(f) **The sum of the room basic factors is the house basic factor.**

This factor is used in estimating the furnace size. See ARTICLE 3, Section 1, (a).

Section 2. The air supply for each room in c.f.m. is obtained by multiplying the **room basic factor** by that factor in Table 1, representing the desired register air temperature. For example, if the desired register air temperature is to be 135 degrees, use 13.2; if register air temperature is to be 140 degrees, use 12.3, etc.

Table 1

Register air temp.	Factor
150	10.9
145	11.6
140	12.3
135	13.2
130	14.2
125	15.4
120	16.8

For the derivation of factors in Table 1, see Note 4.

Section 3. Round individual warm air ducts.

(a) The cross sectional area of a round individual warm air duct in square inches for a given room shall be obtained by multiplying the **room basic factor** by factor in Table 2, representing the desired air velocity. For example, at 500 f.p.m. and 135 degrees register temperature, the factor is 3.8; at 400 f.p.m. and a register temperature of 125 degrees, the factor is 5.6. (For derivation of these factors, see Note 4.)

TABLE 2

Air velocity	Register air temperature, degrees Fahr. (return air temperature being 65 degrees Fahr.)						
f.p.m.	120	125	130	135	140	145	150
200	12.1	11.1	10.2	9.5	8.9	8.3	7.8
250	9.7	8.9	8.2	7.6	7.1	6.7	6.3
300	8.1	7.4	6.8	6.3	5.9	5.6	5.2
350	6.9	6.4	5.9	5.4	5.1	4.8	4.5
400	6.1	5.6	5.1	4.8	4.4	4.2	3.9
500	4.9	4.4	4.1	3.8	3.6	3.3	3.1
600	4.0	3.7	3.4	3.2	3.0	2.8	2.6
700	3.5	3.2	2.9	2.7	2.5	2.4	2.2
800	3.0	2.8	2.6	2.4	2.2	2.1	2.0
900	2.7	2.5	2.3	2.1	2.0	1.9	1.7
1000	2.4	2.2	2.1	1.9	1.8	1.7	1.6

(b) Having determined the cross sectional area of the round individual warm air duct in square inches the corresponding size of the round pipe may be obtained from Table 3.

Section 4. Rectangular individual warm air ducts.

The dimensions of any rectangular duct section shall be the rectangular equivalent of the round pipe size determined according to paragraphs (a) and (b) of ARTICLE 2, Section 3. This rectangular equivalent may be obtained from Table 4.

Section 5. Round warm air trunk line systems.

(a) Make a general diagram of the arrangement of all branches and trunks to connect all warm air discharge registers with the heating unit, and calculate the area of each branch according to ARTICLE 2, Section 3, (a) and (b).

(b) Starting at the extreme end of the duct and working back toward the heating unit, the area of the most remote section of the trunk line (Station A, Fig. 1) shall be 10% less than the combined areas of the two or more branches joined together to form this part of the trunk. At the next junction of one or more branches with the trunk (Station B), the new trunk section shall be 10% less than the sum of the areas of the preceding trunk section plus the areas of the branches joining at this point. See illustrative example following.

EXAMPLE

Assuming the duct plan as given in Fig. 1, 50 + 40 = 90, less 10% = 81 sq. in. at the end of the trunk. 81 + 40 + 50 = 171, less 10% = 154. 154 + 50 = 204, less 10% = 184 sq. in.

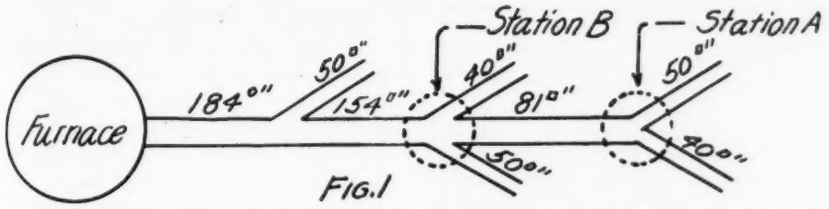


Fig. 1 is an example showing how a duct system is sized. The text explains the application of the 10 per cent reduction rule for branch takeoffs.

Check. 50 + 40 + 50 + 40 + 50 = 230 sq. in. of total branch area. 184 ÷ 230 = 80 per cent. The main duct area at the heating unit is, therefore, 80 per cent of the total area of all the branches, for the number and size of branches given in this particular example.

(c) The area of the main duct at the heating unit shall in no case be less than 70 per cent of the sum of all the branches from the main duct.

(d) Having determined the areas of all parts of the warm air piping system, find from Table No. 3, the diameter of round pipe for each section of the trunk duct.

Section 6. Rectangular duct warm air trunk line systems.

(a) Proceed as directed in ARTICLE 2, Section 5, to design the system for round pipe trunks and branches.

(b) Change all sections of round pipe to the equivalent dimensions of rectangular ducts by means of Table 4.

Section 7. Wall Stacks.

When a round branch connects to a rectangular wall stack, determine the dimensions of the stack and select the size as directed in ARTICLE 2, Section 4.

Section 8. Warm air registers.

(a) When registers or grilles are placed below the breathing level, the net free area in square inches shall be not less than **six times the room basic factor.** This is for an air velocity through the free area of the register of approximately 300 feet per minute.

(b) When registers are placed in the wall more than six feet above the floor, the net free area of the register in square inches shall be not less than **four times the room basic factor.** This is for a velocity of approximately 480 feet per minute through the net free area of the register.

(c) Registers should be the approximate width of stacks or fittings to which they connect. Standard commercial sizes should be used when possible.

Section 9. Return air ducts.

(a) Return air ducts should be brought back from as many rooms as possible and care should be taken to withdraw from each room, or series of inter-communicating rooms, air equivalent to the amount delivered to the room or series of inter-communicating rooms.

(b) Sizes of either individual pipe or trunk line systems of return air ducts and stacks should be calculated on the same basis as warm air supply ducts and stacks, ARTICLE 2, Sections 3 to 7, inclusive.

Section 10. Dampers.

Each warm air duct leaving the furnace in an individual duct system and each branch from any main trunk line in a trunk line system should be equipped with a damper having a substantial locking device. Return air ducts should be similarly equipped.

ARTICLE 3

Mechanical Equipment

Section 1. Furnace.

(a) Multiply the **house basic factor** from ARTICLE 2, Section 1, (f), by 1000. This gives the B.t.u. heat less from the rooms heated. Divide this by 136 to obtain the Standard Code gravity rating of the furnace.

(b) If the furnace used is designed for gravity circulation, a well fitted and securely attached inner casing should be installed of a shape to conform to the shape of the furnace body

TABLE 3

CROSS SECTIONAL AREAS OF ROUND PIPES

Diam.	Area	Diam.	Area	Diam.	Area	Diam.	Area	Diam.	Area	Diam.	Area
4.0	12.6	9.0	63.6	14.0	153.9	19.0	283.5	24.0	452.4	29.0	660.1
4.1	13.2	9.1	65.0	14.1	156.1	19.1	286.5	24.1	456.2	29.1	665.1
4.2	13.9	9.2	66.5	14.2	158.4	19.2	289.5	24.2	460.0	29.2	669.7
4.3	14.5	9.3	67.9	14.3	160.6	19.3	292.6	24.3	463.8	29.3	674.3
4.4	15.2	9.4	69.4	14.4	162.9	19.4	295.6	24.4	467.6	29.4	678.9
4.5	15.9	9.5	70.9	14.5	165.1	19.5	298.6	24.5	471.4	29.5	683.5
4.6	16.6	9.6	72.4	14.6	167.4	19.6	301.7	24.6	475.3	29.6	688.1
4.7	17.3	9.7	73.9	14.7	169.7	19.7	304.8	24.7	479.2	29.7	692.8
4.8	18.1	9.8	75.4	14.8	172.0	19.8	307.9	24.8	483.1	29.8	697.5
4.9	18.9	9.9	77.0	14.9	174.4	19.9	311.0	24.9	487.0	29.9	702.2
5.0	19.6	10.0	78.5	15.0	176.7	20.0	314.2	25.0	490.9	30.0	706.9
5.1	20.4	10.1	80.1	15.1	179.1	20.1	317.3	25.1	494.8	30.1	711.6
5.2	21.2	10.2	81.7	15.2	181.5	20.2	320.5	25.2	498.8	30.2	716.3
5.3	22.1	10.3	83.3	15.3	183.9	20.3	323.7	25.3	502.7	30.3	721.1
5.4	22.9	10.4	84.9	15.4	186.3	20.4	326.9	25.4	506.7	30.4	725.8
5.5	23.8	10.5	86.6	15.5	188.7	20.5	330.1	25.5	510.7	30.5	730.6
5.6	24.6	10.6	88.2	15.6	191.1	20.6	333.3	25.6	514.7	30.6	745.4
5.7	25.5	10.7	89.9	15.7	193.6	20.7	336.5	25.7	518.7	30.7	740.2
5.8	26.4	10.8	91.6	15.8	196.1	20.8	339.8	25.8	522.8	30.8	745.1
5.9	27.3	10.9	93.3	15.9	198.6	20.9	343.1	25.9	526.9	30.9	749.9
6.0	28.3	11.0	95.0	16.0	201.1	21.0	346.4	26.0	530.9	31.0	754.8
6.1	29.2	11.1	96.8	16.1	203.6	21.1	349.7	26.1	535.0	31.1	759.6
6.2	30.2	11.2	98.5	16.2	206.1	21.2	353.0	26.2	539.1	31.2	764.5
6.3	31.2	11.3	100.3	16.3	208.7	21.3	356.3	26.3	543.3	31.3	769.4
6.4	32.2	11.4	102.1	16.4	211.2	21.4	359.7	26.4	547.4	31.4	774.4
6.5	33.2	11.5	103.9	16.5	213.8	21.5	363.1	26.5	551.5	31.5	779.3
6.6	34.2	11.6	105.7	16.6	216.4	21.6	366.4	26.6	555.7	31.6	784.3
6.7	35.3	11.7	107.5	16.7	219.0	21.7	369.8	26.7	559.9	31.7	789.2
6.8	36.3	11.8	109.4	16.8	221.7	21.8	373.3	26.8	564.1	31.8	794.2
6.9	37.4	11.9	111.2	16.9	224.3	21.9	376.7	26.9	568.3	31.9	799.2
7.0	38.5	12.0	113.1	17.0	227.0	22.0	380.1	27.0	572.6	32.0	804.3
7.1	39.6	12.1	115.0	17.1	229.7	22.1	383.6	27.1	576.8	32.1	809.3
7.2	40.7	12.2	116.9	17.2	232.4	22.2	387.1	27.2	581.1	32.2	814.3
7.3	41.9	12.3	118.8	17.3	235.1	22.3	390.6	27.3	585.3	32.3	819.4
7.4	43.0	12.4	120.8	17.4	237.8	22.4	394.1	27.4	589.6	32.4	824.5
7.5	44.2	12.5	122.7	17.5	240.5	22.5	397.6	27.5	594.0	32.5	829.6
7.6	45.4	12.6	124.7	17.6	243.3	22.6	401.2	27.6	598.3	32.6	834.7
7.7	46.6	12.7	126.7	17.7	246.1	22.7	404.7	27.7	602.6	32.7	839.8
7.8	47.8	12.8	128.7	17.8	248.8	22.8	408.3	27.8	607.0	32.8	845.0
7.9	49.0	12.9	130.7	17.9	251.6	22.9	411.9	27.9	611.4	32.9	850.1
8.0	50.3	13.0	132.7	18.0	254.5	23.0	415.5	28.0	615.8	33.0	855.3
8.1	51.5	13.1	134.8	18.1	257.3	23.1	419.1	28.1	620.2	33.1	860.5
8.2	52.8	13.2	136.8	18.2	260.2	23.2	422.7	28.2	624.6	33.2	865.7
8.3	54.1	13.3	138.9	18.3	263.0	23.3	426.4	28.3	629.0	33.3	870.9
8.4	55.4	13.4	141.0	18.4	265.9	23.4	430.1	28.4	633.5	33.4	876.2
8.5	56.7	13.5	143.1	18.5	268.8	23.5	433.7	28.5	637.9	33.5	881.4
8.6	58.1	13.6	145.3	18.6	271.7	23.6	437.4	28.6	642.4	33.6	886.7
8.7	59.4	13.7	147.4	18.7	274.6	23.7	441.2	28.7	646.9	33.7	892.0
8.8	60.8	13.8	149.6	18.8	277.6	23.8	444.9	28.8	651.4	33.8	897.3
8.9	62.2	13.9	151.7	18.9	280.6	23.9	448.6	28.9	656.0	33.9	902.6

In this table, cross sectional areas for round pipe from 4 inches to 33 inches are given. In using the table disregard the fractional sizes and use the nearest standard sized pipe.

TABLE NO. 4

EQUIVALENT ROUND AND RECTANGULAR DUCTS FOR EQUAL FRICTION

Side of Rect. Duct	Diameter of Equivalent Round Pipe																			
	2½	3	3½	4	4½	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
8	4.7	5.2	5.7	6.1	6.5	6.9	7.6	8.2	8.8											
8½	4.9	5.4	5.9	6.3	6.7	7.1	7.8	8.5	9.1	9.6										
9	5.0	5.5	6.0	6.5	6.9	7.3	8.0	8.7	9.3	9.9										
9½	5.1	5.7	6.2	6.6	7.1	7.5	8.2	8.9	9.6	10.2	10.7									
10	5.2	5.8	6.3	6.8	7.2	7.7	8.4	9.2	9.8	10.4	11.0									
10½	5.4	5.9	6.5	7.0	7.4	7.8	8.6	9.4	10.0	10.7	11.3	11.8								
11	5.5	6.0	6.6	7.1	7.6	8.0	8.8	9.6	10.2	10.9	11.5	12.1	12.6							
11½	5.6	6.2	6.7	7.2	7.7	8.2	9.0	9.8	10.5	11.2	11.8	12.4	12.9	13.4						
12	5.7	6.3	6.9	7.4	7.9	8.3	9.2	10.0	10.7	11.4	12.0	12.6	13.2	13.7						
12½	5.8	6.4	7.0	7.5	8.0	8.5	9.4	10.2	10.9	11.6	12.2	12.9	13.5	14.0						
13	5.9	6.5	7.1	7.7	8.2	8.7	9.6	10.4	11.1	11.8	12.5	13.1	13.7	14.3						
13½	6.0	6.6	7.3	7.8	8.3	8.8	9.7	10.6	11.3	12.1	12.7	13.4	14.0	14.6	15.1					
14	6.1	6.7	7.4	7.9	8.5	8.9	9.9	10.8	11.5	12.3	12.9	13.6	14.3	14.9	15.4					
14½	6.2	6.8	7.5	8.1	8.6	9.1	10.1	11.0	11.7	12.5	13.2	13.9	14.5	15.1	15.7	16.2				
15	6.3	6.9	7.6	8.2	8.7	9.2	10.2	11.1	11.9	12.7	13.4	14.1	14.7	15.3	16.0	16.5				
15½	6.4	7.0	7.7	8.3	8.9	9.4	10.4	11.3	12.1	12.9	13.6	14.3	14.9	15.6	16.2	16.8	17.3			
16		7.1	7.8	8.4	9.0	9.5	10.5	11.4	12.3	13.1	13.8	14.5	15.2	15.8	16.5	17.1	17.6			
17		7.3	8.1	8.6	9.2	9.8	10.8	11.8	12.6	13.5	14.2	15.0	15.7	16.3	17.0	17.6	18.2	18.7		
18			8.2	8.8	9.5	10.0	11.1	12.1	13.0	13.8	14.6	15.4	16.1	16.8	17.4	18.1	18.7	19.2	19.8	
19				9.1	9.7	10.3	11.4	12.4	13.3	14.2	15.0	15.8	16.5	17.2	17.9	18.6	19.2	19.8	20.4	20.9
20						10.5	11.6	12.7	13.6	14.5	15.4	16.2	17.0	17.6	18.4	19.0	19.7	20.3	20.9	21.5
21						10.8	11.9	12.9	13.9	14.9	15.7	16.5	17.4	18.0	18.8	19.5	20.1	20.8	21.4	22.0
22						11.0	12.1	13.2	14.2	15.2	16.1	16.9	17.8	18.5	19.2	19.9	20.6	21.3	21.9	22.5
23						11.2	12.4	13.6	14.5	15.5	16.4	17.3	18.1	18.9	19.6	20.4	21.1	21.7	22.4	23.0
24						11.4	12.6	13.8	14.8	15.8	16.8	17.6	18.5	19.3	20.0	20.8	21.5	22.2	22.8	23.5
25						11.6	12.8	14.0	15.1	16.1	17.0	17.9	18.8	19.6	20.4	21.2	21.9	22.6	23.3	24.0
26						11.8	13.1	14.3	15.4	16.4	17.3	18.3	19.2	20.0	20.8	21.6	22.3	23.0	23.8	24.4
27						12.0	13.3	14.5	15.6	16.7	17.6	18.6	19.5	20.4	21.2	22.0	22.7	23.5	24.2	25.0
28						12.2	13.5	14.8	15.9	17.0	18.0	19.0	19.8	20.7	21.5	22.4	23.1	23.9	24.6	25.3
29						12.4	13.7	15.0	16.1	17.2	18.2	19.2	20.2	21.0	21.9	22.7	23.5	24.3	25.0	25.7
30						12.6	13.9	15.2	16.4	17.5	18.5	19.5	20.5	21.4	22.2	23.1	23.9	24.7	25.4	26.2
31						12.7	14.1	15.4	16.6	17.7	18.8	19.8	20.8	21.7	22.5	23.4	24.2	25.0	25.8	26.6
32						12.9	14.3	15.6	16.9	18.0	19.1	20.1	21.1	22.0	22.9	23.8	24.6	25.4	26.2	27.0
33						13.1	14.5	15.8	17.1	18.2	19.3	20.4	21.4	22.3	23.2	24.1	25.0	25.8	26.5	27.3
34						13.2	14.7	16.1	17.3	18.5	19.6	20.7	21.6	22.6	23.5	24.4	25.3	26.2	26.9	27.7
35						13.4	14.9	16.2	17.5	18.7	19.8	20.9	21.9	22.9	23.9	24.7	25.6	26.5	27.2	28.1
36							15.1	16.4	17.7	19.0	20.1	21.2	22.2	23.2	24.2	25.1	26.0	26.8	27.7	28.5
37							15.2	16.6	17.9	19.2	20.3	21.4	22.5	23.5	24.5	25.4	26.3	27.1	28.0	28.8
38							15.4	16.8	18.2	19.4	20.6	21.7	22.8	23.8	24.8	25.8	26.7	27.5	28.4	29.2
39							15.5	17.0	18.4	19.6	20.8	21.9	23.0	24.1	25.1	26.1	27.0	27.8	28.7	29.5
40							15.7	17.2	18.6	19.8	21.1	22.2	23.3	24.4	25.4	26.4	27.3	28.2	29.1	29.9
41							15.9	17.4	18.8	20.0	21.3	22.4	23.5	24.6	25.6	26.6	27.6	28.5	29.4	30.3
42							16.1	17.6	19.0	20.3	21.6	22.7	23.8	24.9	25.9	26.9	27.9	28.8	29.8	30.7
43								17.8	19.2	20.5	21.8	22.9	24.0	25.1	26.2	27.2	28.2	29.1	30.0	30.9
44								18.0	19.4	20.7	22.0	23.1	24.3	25.4	26.5	27.5	28.5	29.5	30.3	31.2
45								18.2	19.6	20.9	22.2	23.3	24.5	25.6	26.7	27.8	28.8	29.8	30.6	31.5
46								18.4	19.8	21.1	22.4	23.6	24.8	25.9	27.0	28.1	29.1	30.1	31.0	31.9
47								18.6	19.9	21.3	22.6	23.8	25.0	26.1	27.2	28.3	29.3	30.3	31.2	32.2
48									20.1	21.5	22.8	24.1	25.2	26.4	27.5	28.6	29.6	30.5	31.6	32.5
49									20.2	21.7	23.0	24.3	25.4	26.6	27.7	28.9	29.9	30.9	31.9	32.8
50									20.4	21.9	23.2	24.5	25.7	26.9	28.0	29.2	30.3	31.3	32.2	33.1
51									20.6	22.0	23.4	24.7	25.9	27.1	28.2	29.4	30.5	31.5	32.5	33.4
52									20.8	22.2	23.6	24.9	26.2	27.4	28.5	29.6	30.7	31.8	32.9	33.8
53									20.9	22.4	23.8	25.1	26.4	27.6	28.7	29.8	30.9	32.0	33.1	34.1
54									21.1	22.6	24.0	25.3	26.6	27.8	29.0	30.1	31.2	32.3	33.4	34.4
55									21.3	22.7	24.2	25.5	26.8	28.0	29.2	30.3	31.4	32.6	33.6	34.6

From table 3 round pipe can be converted to rectangular duct by using this chart. Take the round pipe size at the top, then determine how deep the duct is to be and where the two columns meet is the required duct width.

and of such dimensions as to leave a free air space in square inches equal to approximately 0.45 times the total c. f. m. handled by the system. It should be so installed that air cannot pass between this inner casing and the regular outer casing of the furnace.

Section 2. Blower.

(a) The blower capacity in c. f. m. will be the sum of the c. f. m. required for all the rooms as determined in ARTICLE 2, Section 2, plus 15 per cent, except that if this volume amounts to less than four changes or recirculations per hour, blower capacity should be increased to provide for four changes per hour.

(b) If the exact static pressure (Note 7) is not known, use the following values which meet average conditions:

Up to 1500 cfm, ⅛-in. water gauge.

From 1500 up to 2000 cfm, $\frac{3}{16}$-in. water gauge.

From 2000 up to 3000 cfm, ¼-in. water gauge.

From 3000 up to 4000 cfm, $\frac{5}{16}$-in. water gauge.

From 4000 up to 5000 cfm, ⅜-in. water gauge.

These allowances for static pressures apply when no washers or filters are used. If either or both are used, consult manufacturer for static pressure to be added to the above and order blower on this basis. For details of blower connections, locations, etc., consult manufacturer's catalog.

Section 3. Controls.

(a) An adjustable, automatic furnace switch should be placed in the bonnet of the furnace to start and stop the blower at predetermined temperatures. Under average conditions it should be set to start the blower at from 130 to 175 degrees and to stop it at from 100 to 130 degrees.

(b) A manual switch for summer control should be placed in the hallway, stairway or other accessible location, but should not be placed where it is liable to be turned by mistake. This switch should be so wired in conjunction with the automatic switch in the furnace casing that the blower cannot be stopped when the furnace is hot.

TABLE A

	Exposed Wall	Factors
No. 1—(a)	Frame Wall constructed of siding, paper, sheathing, studding, lath and plaster	60
(b)	Same (1-a) construction substituting ½" fibrous board or equivalent for the lath	80
(c)	Same (1-a) construction with additional 3½" insulating fill between studding	140
	For stucco on frame walls, use the same values as for frame with siding, as shown in 1-(a), 1-(b) and 1-(c).	
No. 2—	9" Brick wall plastered on one side	40
No. 3—(a)	9" Brick wall, air space, furred and plastered	57
(b)	Same (3-a) construction substituting ½" fibrous board or equivalent for the lath	84
No. 4—	13" Brick wall, plastered on one side	52
No. 5—(a)	13" Brick wall, air space, furred and plastered	69
(b)	Same (5-a) construction substituting ½" fibrous board or equivalent for the lath	97
No. 6—	4" Brick, 4" or 8" hollow tile plastered	57
No. 7—(a)	4" Brick, paper, sheathing, studding, lath and plaster (brick veneer)	58
(b)	Same (7-a) construction substituting ½" fibrous board or equivalent for the lath	84
(c)	Same (7-a) construction with additional 3½" insulating fill between studding	158
No. 8—	Stucco on 8" hollow tile, and plaster	48
No. 9—(a)	Stucco on 8" hollow tile, furred and plastered	65
(b)	Same (9-a) construction substituting ½" fibrous board or equivalent for the lath	95
	Ceilings—With Attic Space Above	
No. 10—(a)	Lath and plaster without floor above	50
(b)	Same (10-a) construction substituting ½" fibrous board or equivalent for the lath	70
(c)	Same (10-a) construction with additional ½" fibrous board or equivalent nailed on top of joists	90
(d)	Same (10-a) construction with additional 3½" insulating fill between joists	150

No. 11—(a) Lath and plaster with tight floor above 90
(b) Same (11-a) construction substituting ½" fibrous board or equivalent for the lath.....104
(c) Same (11-a) construction with additional 3½" insulating fill between joists 183
No. 12—(a) Metal without floor above..... 40
(b) Same (12-a) construction with additional ½" fibrous board or equivalent between metal and joists 65
(c) Same (12-a) construction with additional ½" fibrous board fastened on top of joists..... 85
(d) Same (12-a) construction with additional 3½" insulating fill between joists 145
No. 13—(a) Metal with tight floor above.. 75
(b) Same (13-a) construction with additional ½" fibrous board between metal and joists..... 95
(c) Same (13-a) construction with additional 3½" insulating fill.176

Ceilings—Without Attic Space Above —Part of the Roof

No. 14—(a) Lath, plaster, rafter, sheathing, any type of shingles or roofing 57
(b) Same (14-a) construction substituting ½" fibrous board or equivalent for the lath..... 74
(c) Same (14-a) construction with additional 3½" insulating fill.130

Floors—Over Exposed or Unheated Spaces

No. 15—(a) Double floor, on joists..... 42
(b) Same (15-a) construction with additional ½" fibrous board fastened to bottom of joists.. 88
(c) Same (15-a) construction with sheathing fastened to bottom of joists and with additional 3½" insulating fill between joists 140
The substitution of ½" insulating materials for sheathing should not be considered as having any additional insulating value.

Note 1. In obtaining glass surface use full casement opening. An outside door is figured as glass.

Note 2. To obtain net outside wall, multiply height by width and deduct all windows and outside doors as obtained in Note 1. For all rooms with attic space immediately above, full ceiling areas shall be taken into account using Table A (From the Standard Gravity Code). Floors over unheated spaces shall be taken into account using Table A. For walls and doors between heated and unheated spaces, use 50% of similar outside exposure.

Note 3. The divisor 800 is for an estimated air change due to infiltration of outside air amounting to one room volume per hour and is generally used for rooms having one side exposed. For rooms having two sides exposed use divisor 600, which corresponds with 1.5 air changes per hour; for rooms having three sides exposed use divisor 400, which corresponds with two air changes per hour.

Note 4. The factors in Table 1 and Table 2 are obtained from the following equations:

$$rbf = \frac{G}{12} + \frac{W}{Fw} + \frac{C}{Fc} + \frac{F}{Ft} + \frac{Q}{800} \quad \ldots\ldots(1)$$

$$Btu = 1000 \times rbf \quad \ldots\ldots(2)$$

$$Btu = cfm \times 60 \times 0.075 \times 0.24 \times Ta \quad \ldots\ldots(3)$$

in which

Btu = heat loss of room in British thermal units per hour
rbf = room basic factor (ART. 2, Sec 1, (e))
G = exposed glass surface, square feet
W = net exposed wall surface, square feet
C = net cold ceiling area, square feet
F = net area cold floor, square feet
Q = cubic content of room cubic feet
Fw, Fc, Ft = factors from Table "A," Standard Code.
cfm = cubic feet of air required per minute
Ta = temperature drop in degrees F. from register air temperature to 65 degrees F. return air temp.
60 = minutes per hr.
0.075 = weight in pounds of one cubic foot of air at 70 deg.
0.24 = Btu required to raise the temperature of one pound of air one degree F., or given up by one pound of air in cooling one degree F.

Equating the second members of equations (2) and (3), combining and simplifying:

$$cfm = \frac{rbf \times 926}{Ta} \quad \ldots\ldots(4)$$

$$A = \frac{144 \times cfm}{fpm} \quad \ldots\ldots(5)$$

in which

fpm = air velocity in feet per minute
A = cross sectional area of duct or free area of register in square inches.

Substituting in equation (5) the value of cfm shown in equation (4) and simplifying:

$$A = \frac{133{,}333}{fpm \times Ta} \times rbf \quad \ldots\ldots(6)$$

The factors in Table 1 are the numerical values of the fraction $\frac{926}{Ta}$ in equation (4) corresponding to various register air temperatures, the return air temperature in each case being 65 deg. F.

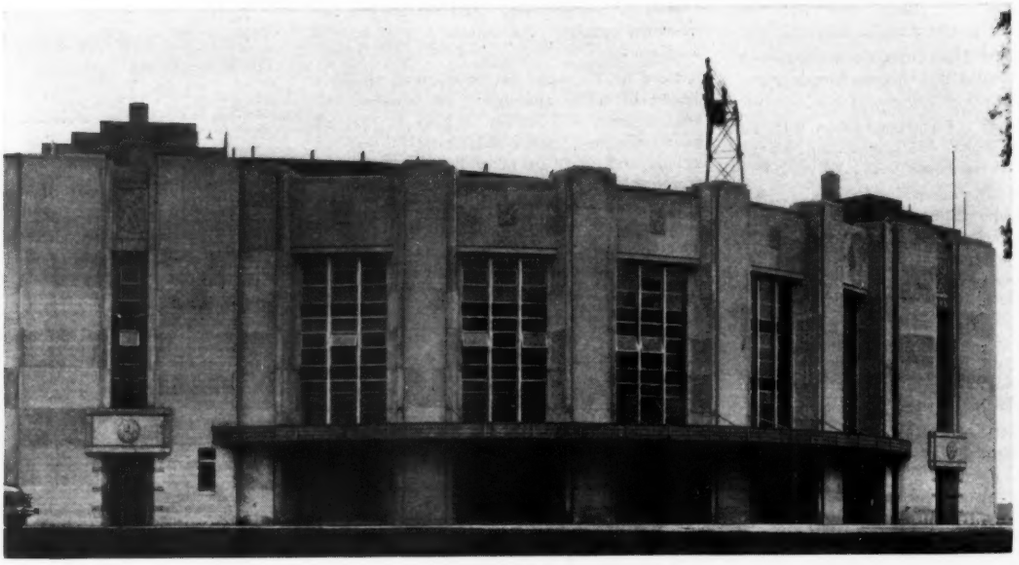
The factors in Table 2 are the numerical values of the fraction $\frac{133{,}333}{fpm \times Ta}$ in equation (6) for various velocities in feet per minute (fpm) and various register air temperatures, the return air temperature in each case being 65 degrees F.

Note 5. If individual round pipes are used, it is common practice to use standard commercial sizes. If the calculated pipe area is not more than 10% greater than a standard commercial size, then the nearest commercial size may be used. (The fractional diameters given in Table 3 are for use in more accurately determining rectangular equivalents or round pipes in conjunction with Table 4.)

Note 6. In mechanical forced air heating systems the same sizes of basement pipes and wall stacks are used for all floors contrary to the Standard (gravity) Code because the velocity of air flow under the pressure influence of a blower is greater than the velocity produced by the aspirating effect of risers in a system operating by natural gravity circulation.

Note 7. Static pressure is the pressure (measured by water gauge) that must be exerted by the blower to overcome frictional resistance in the system and maintain proper air delivery.

For many months the Joint Code Committee of the National Warm Air Heating Association and the Code Committee of the Furnace Blower Manufacturers Association have been compiling this tentative code for forced air installation. The code is the result of endless sorting out of innumerable suggestions which have resulted from the wide divergence of opinion on what should and what should not govern fan application. American Artisan believes that the two committees should be complimented highly on this result of their efforts. Doubtless many changes will be made as the code finds application. This will not, however, detract in the least from the value of this code, which marks a determined effort to take guesswork out of forced air heating.



A Stadium Marquise

THE Perry stadium in Indianapolis, Indiana, has an aluminum and lead coated copper marquise incorporating in its fabrication several interesting metal handling methods to meet restrictions of shape, design and ornamentation.

The fabrication and erection of the marquise is the work of the Henry C. Smither Roofing Company, of Indianapolis.

The marquise is crescent in shape to follow the general oval outline of the stadium walls. Under the canopy are the ticket offices, entrance doors and stairways to offices. At the center line the depth is 15 feet, tapering to the ends where the depth is 10 feet adjoining the buttress and flush at the buttress face.

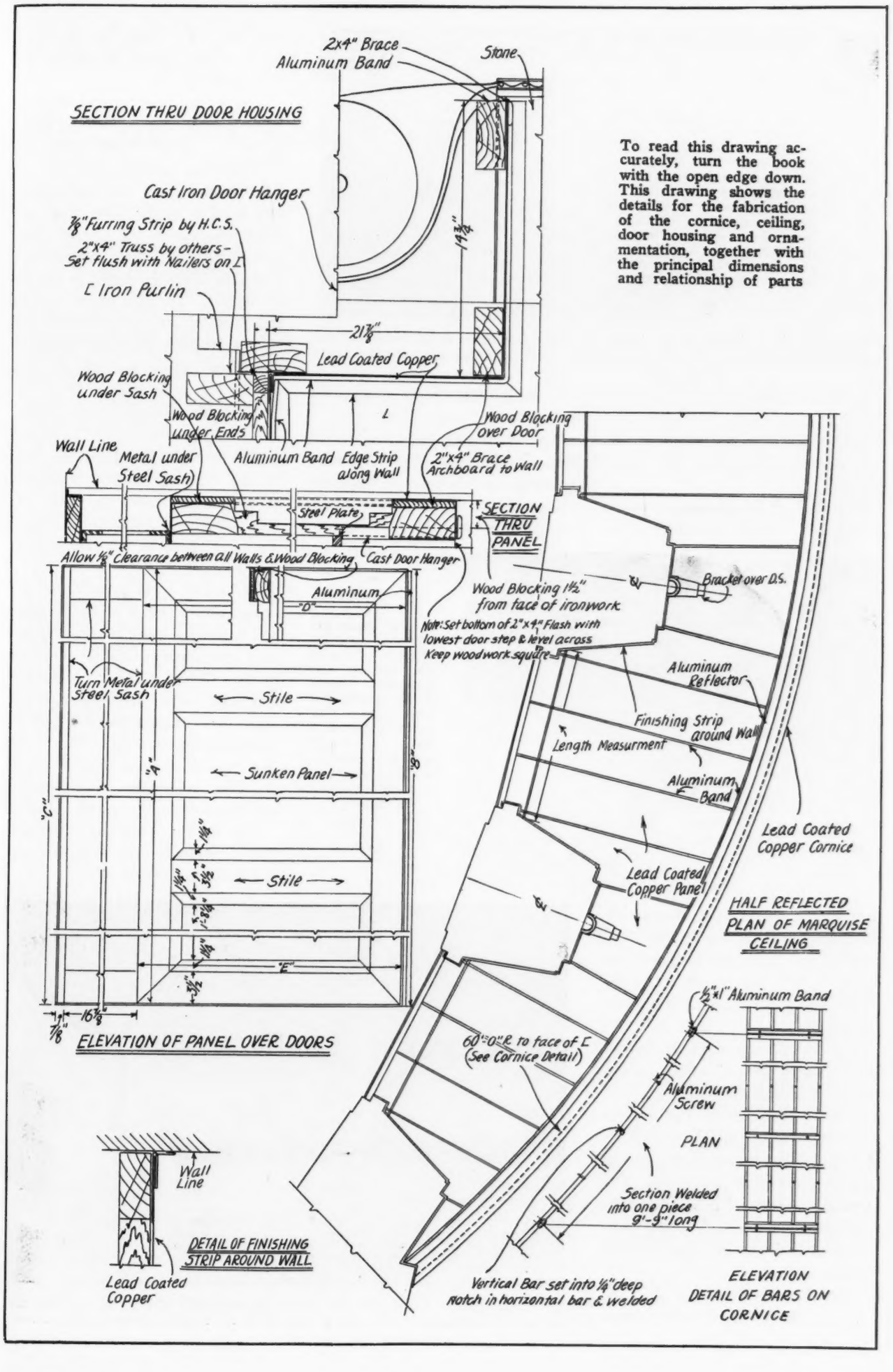
Because of this shape short length sheets were used in the ceiling in order to get as many sheets of uniform length as possible so that some degree of rapid production might be followed in the shop. The ceiling sheets are all uniform in width, the taper due to the crescent shape being accommodated in the extra wide sheets which project out from the faces of the buttresses.

The ceiling sheets are lead-coated copper erected in the natural finish. The ceiling sheets are erected on wood backup with depth seams covered with aluminum bands held into the backup by metal screws. These seam bands have folded edges so that when fastened on the ceiling both edges present a rounded surface to the observer.

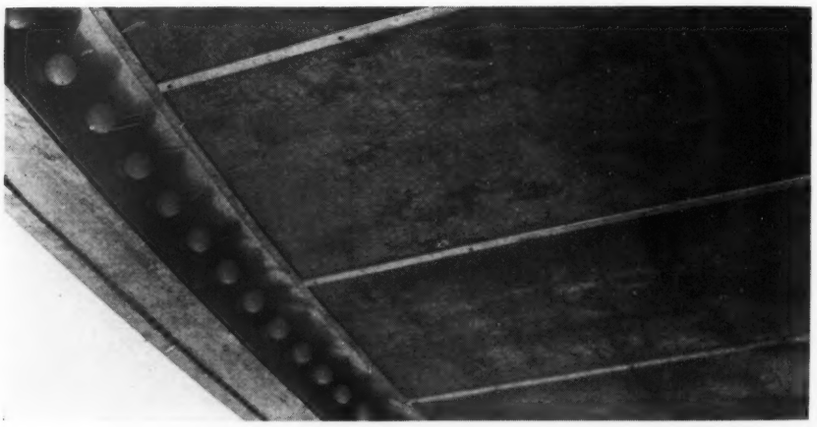
The sheets which take up the taper of the marquise are all narrower at the back than at the front as shown on the ceiling plan. These sheets are held to the backup in the same manner as the standard ceiling sheets.

Around the outer perimeter of the ceiling there is a square angled light reflector holding a continuous row of bulbs. This reflector section is aluminum and is formed as shown on one of the photographs.

The photograph above and this closeup show the cornice and general design of the lead coated copper and aluminum marquise. Details of the fabrication are shown in the drawings



To read this drawing accurately, turn the book with the open edge down. This drawing shows the details for the fabrication of the cornice, ceiling, door housing and ornamentation, together with the principal dimensions and relationship of parts



This under view of the ceiling shows the aluminum seam strips over the lead coated copper ceiling sheets, the light reflector and the under edge of the cornice

The reflector sheets have aluminum bands at cross seams and along the inner and lower edges. These bands are also held in place by metal screws.

The face of the marquise has an ornamental cornice consisting of a lead coated copper back sheet which is carried over the top to catch the roofing and under the cornice to be seamed with the reflector sheets. This back sheet is not all one piece, however.

Upon the back sheet horizontal and vertical bars of aluminum are fastened by screws to give a ribbed effect to the cornice face. How these bars appear and how they are fabricated are shown in the photographs and one of the details. The vertical bars are of two forms with double bars at the ends of the back sheet and single bars at the half points.

Both types of vertical bars are sunk ¼ inch into the horizontal bars and fastened by aluminum metal screws.

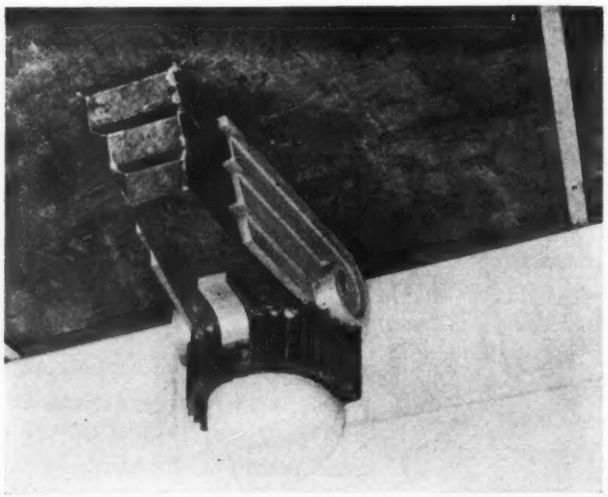
Entrance doors are rolled metal with the housing placed between buttresses and below the marquise ceiling. One of the photographs shows a closeup of the door housing and one of the details shows fabrication of the metal facing on the door housing.

Because the buttresses of the wall project so far out into the ceiling there is a large length of special wall banding required to finish off the metal ceiling. In fabricating this band a special formation was used into which the ceiling sheet was slipped and the folds closed. The fabrication is shown in one of the details. The long upper edge of this finishing strip is held into wood backup by nails while the spring of the sheet holds the lower edge against the stone work.

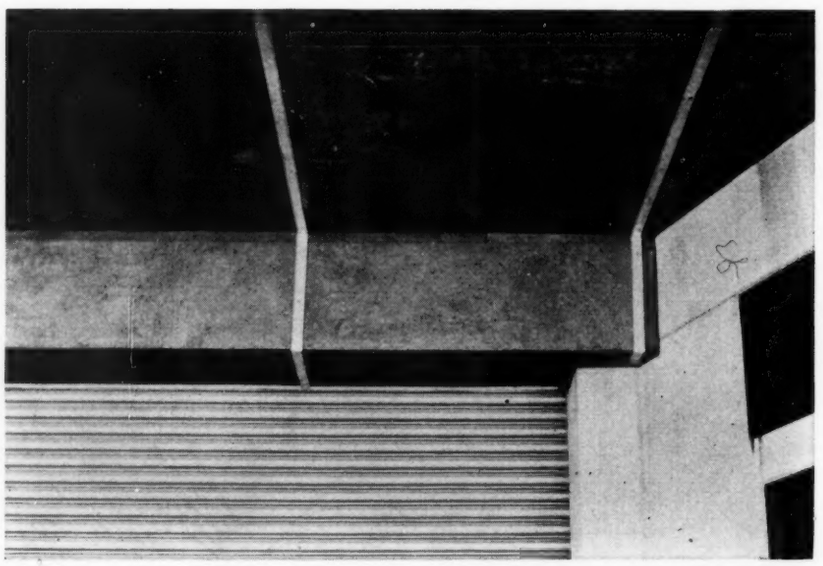
Above the doors there is a series of metal panels fabricated as shown on the details. The panels are held behind the steel window sash and at the bottom above the door stop and under a special aluminum band. This formation of the panel shows in the detail.

The marquise is an essential and ornamental addition to the stadium and in design, color and workmanship harmonizes with the exterior of the stadium. To complete the marquise some 2,400 pounds of lead coated copper and 225 pounds of aluminum were required. Erection was by sections with all material delivered to the job in the flat and erected on the wood framing.

The deck of the marquise was placed by the Smither company and is a built-up, bonded roof.



Drains from the marquise roof are brought through the ceiling and concealed within these ornamental brackets. All parts, other than the wings and under bracket, were fabricated by the Smither Company



The roll-up door is housed in this copper box with the strip ornamentation carried across the box as shown. Note, also, the molding strip adjoining the masonry

Multiple Inlets— A Sure Cure For Cold Walls

By Platte Overton

CERTAIN "professors" of the warm air industry have recently been advocating use of as few inlets and outlets as possible, first to save cost and second because they are theorists and not practical designers. In placing inlets we should seek just one thing —good distribution.

It seems to be the weakness of amateur designers to start at the finish, the furnace being a favorite position. The start of the design of any warm air mechanical, or air conditioning system must without fail begin in the room or rooms to be served. Of course, the data sheet comes first; giving us the requirements, and any designer who attempts the design without this information is wholly incompetent to deal with the situation. For the actual design we must turn our attention to the room.

A Typical Room

A study of the plan in Fig. 1 will give us food for thought regarding multiple inlets and their location. Here we have the dining and living rooms exposed to the prevailing winds, and with relatively large glass areas. The door to the outside in the living room is not protected by a vestibule or a glassed porch.

The dining room is small and with several people around the table half the occupants will have their backs to large areas of glass and exposed wall, this wall and glass within two or three feet of those at the table. This house is located in a district where 20 degrees below is common rather than unusual.

The system will have a humidifying air washer with hot water at the sprays to assure plenty of moisture and the relative humidity will be 40 to 50 per cent; maintained by a humidistat.

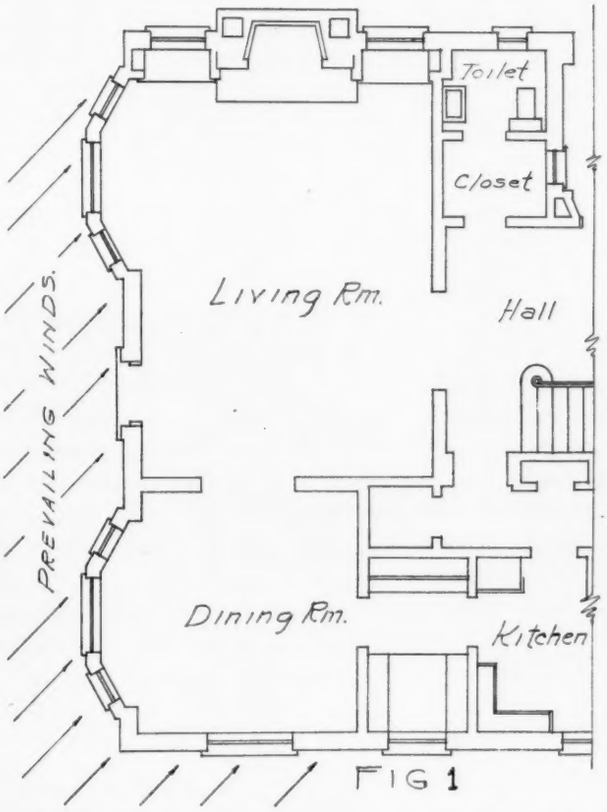


Fig. 1 shows a typical floor plan with living quarters facing prevailing winter winds. The problem is to heat this room uniformly

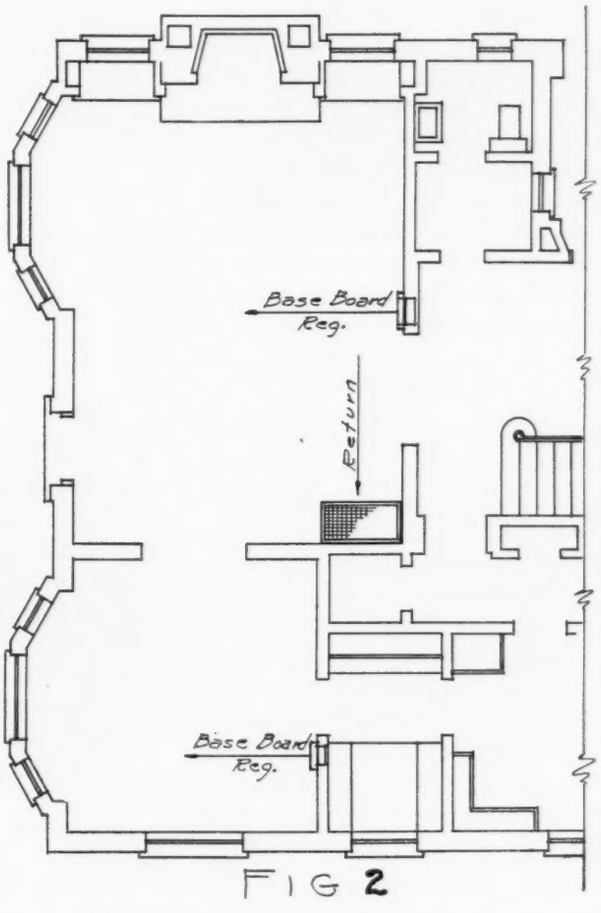


Fig. 2 shows a typical "cheap" installation where the contractor tried to save on warm and cold runs, registers and grilles. Results will be highly uncertain

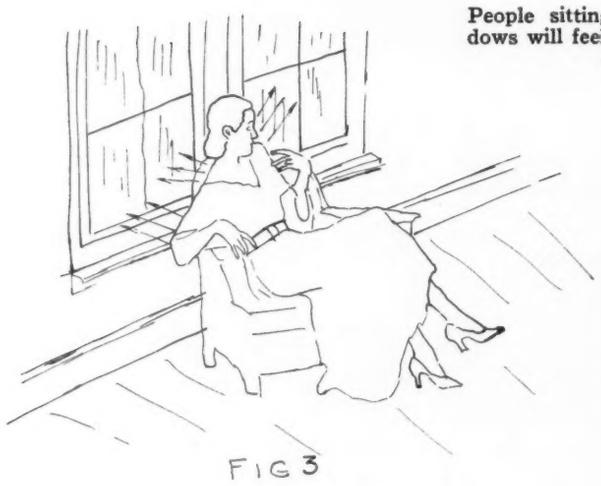


FIG 3

People sitting close to cold windows will feel cold because of body radiation

Fig. 4 shows one satisfactory way to "kill" cold windows by throwing a rising curtain of warm air up along the glass. Velocities should be low.

Any excessive condensation on the glass will be reason for a justifiable complaint and ice or frost will not be tolerated. The home owner will expect uniform temperatures throughout the rooms, and any uncomfortable drafts will bring trouble to the contractor, as well as the owner.

This contractor will not be allowed the alibi of "leaky windows" or "no insulation," if he is faced with the failure of the system, and the owner is not satisfied. The house will not have storm sash and there is no insulation and the contractor is supposed to know it. We will assume that price will not enter into the question and that all the contractors will guarantee the same results. Bear in mind that this is no old style guarantee with "70 degrees in the coldest winter weather."

A Cheap Method

Fig. 2 is the cheap, shoddy, and possibly the worst way the system could be designed. Perhaps it will keep the thermometer at "70 degrees" in zero weather, but there will not be uniform comfort.

Given the choice between this system and a hot water or vapor installation the owner should not hesitate to fill his rooms with radiation. As Joe E. Brown would say, "Them's fightin' words pawdner," but when the blood has been mopped up and the wreckage cleared away we must remember that we are considering the position of the owner—not the warm air heating contractor. We are to assume that we are going to live in this house ourselves, and that it must be the last word in warm air heating and air conditioning.

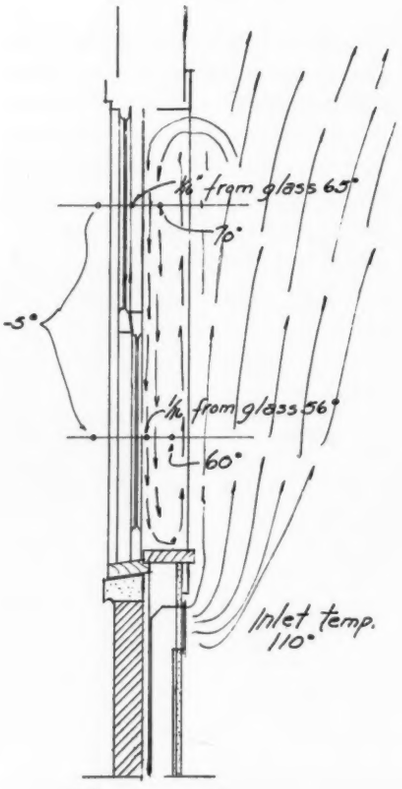


FIG 4

Three items are important in our consideration—warming the outside walls and glass; distribution or diffusion of the air all over the area without drafts; and the elimination of condensation on glass and walls.

Consider Outside Walls

Our first consideration is the warming of outside walls. The human body radiates heat in all directions and this radiation of heat should be in all directions and at the same rate in order to assure comfort and health. Authorities have agreed that in a temperature of 70 degrees, with 40 per cent relative humidity and a slow, but certain air movement over the body, the acme of health and comfort is assured.

Body Radiation

Science has informed us that warm bodies radiate heat toward colder bodies, and the colder the body the more rapid the radiation of heat. Let us consider the person seated in Fig. 3. Within a short distance we have a cold body; the outside wall and glass. If the radiation of heat from the body of the occupant of the chair is high in the direction of the wall in ratio to the radiation in other directions, this person will have a feeling of discomfort.

Our first reaction is to say, "Well, let her move to another part

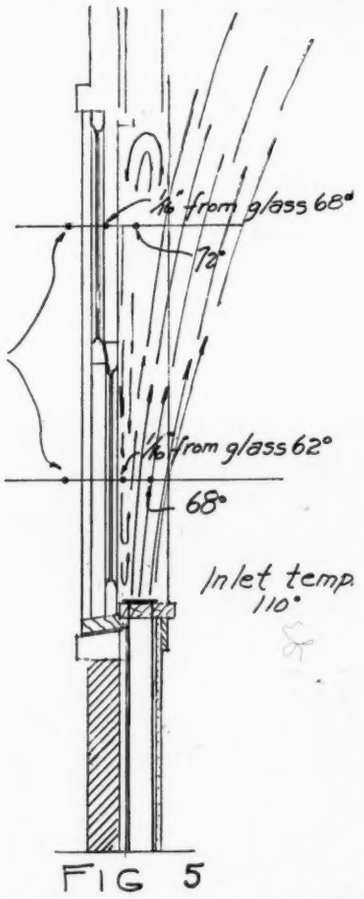


FIG 5

Fig. 5 is an even better method which is rapidly coming into favor with architects. This upward warm air stream eliminates radiation to the glass.

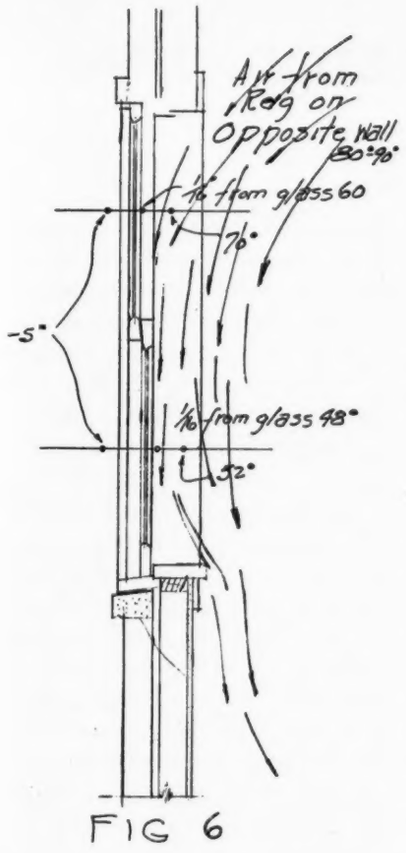


Fig. 6 shows the method to be followed when registers must be placed on walls opposite the windows. Velocities must be stepped up so that the warm air will surely hit the glass no matter how great the outside pressure. Remember, too, that the air will lose temperature getting across the room

of the room." This is akin to saying, "Hitch up the buggy and take a ride," or advising the housewife to use a rubbing board in place of a modern electric washer, or sweeping in place of the vacuum cleaner.

The modern, well-heated and air-conditioned home is comfortable anywhere and at any time.

No doubt the glass surface will be our biggest problem. Our attention is called to the conditions in Figs. 4, 5 and 6. These illustrations carry their own story. The figures representing the temperatures are approximate, but are close enough to call average.

The temperature 1/16 of an inch from the glass in Fig. 4, may be called a minimum for the comfort of any one sitting with 30 inches. Lace curtains will have a tendency to counteract radiant heat passing to the glass surface, but lace curtains come and go with the styles and at this time they are out.

Glass Condensation

We now come to the item of condensation, or the collection of moisture on doors, windows, and walls. Moisture in air is condensed when any cooling process lowers its temperature below its dew* point. The cooling may be caused by: (1) mixing with colder air; (2) radiating heat to cooler objects nearby, as to walls, glass, doors, etc.; (3) expansion—rising air expands and cools 1 degree in every 185 feet. However, item 3 would not enter into our problem.

With air at 70 degrees and a relative humidity of 40 per cent our dew point is 56 degrees. The slightest reduction below this temperature will cause moisture to collect on the cooler surfaces. It will be noted that this is true with the use of intermittent operation of the fan. When the bonnet control cuts out the fan, moisture collects on the windows almost at once. Usually this collected moisture will soon evaporate when the fan is again in service.

We must remember that all these items have little or nothing to do with dry bulb thermometer. The space or living quarters under question will vary not more than ½ to 1 degree. We are satisfied that "70 degrees in coldest winter weather" can be maintained, but our problems are more intricate than just the maintaining of "70 degrees."

*Saturated air at any temperature, when warmed, becomes unsaturated and it can then hold more moisture. Saturated air, when cooled, remains saturated, but loses a part of its moisture by condensing on cold surfaces. The temperature at which cooling air becomes saturated is termed the DEW POINT.

Air Distribution

Our next item is circulation or distribution. There are no set rules for the location of inlets to assure good circulation and distribution. The advice, "plenty of inlets and returns," is based on experience and observation.

The rate of air change, movement, or velocity of air depends largely on the relative humidity, dry bulb temperature, and the use the room is designed for. A recreation

(*Continued on page* 33)

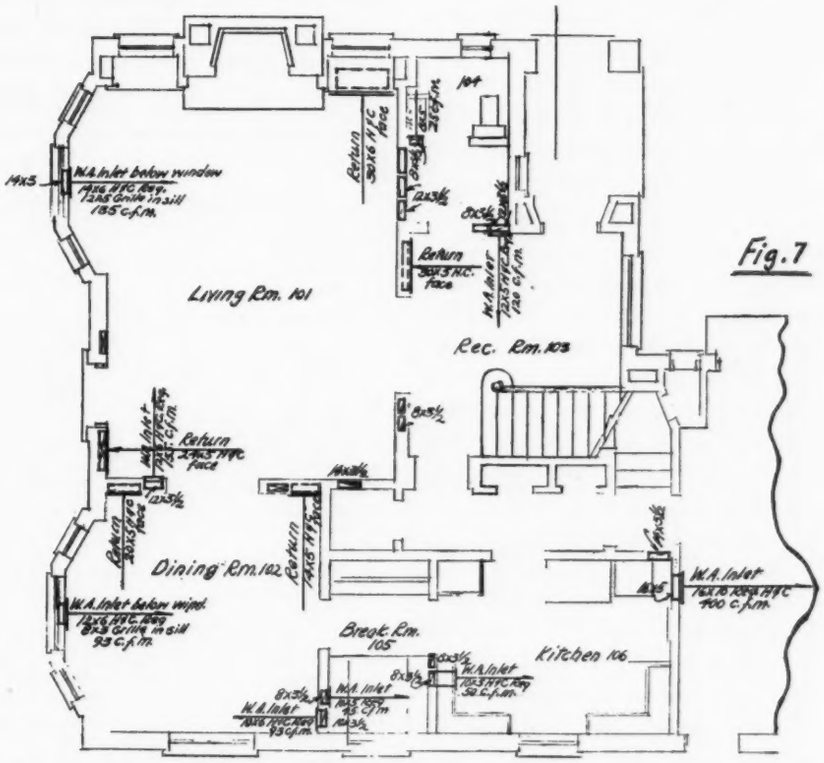


Fig. 7 shows a really effective arrangement of registers and grilles when prevailing winds are as shown in Fig. 1. Note the number and location of faces. Quite different from Fig. 2

Fundamental Psychrometry [Heat]

By Malcolm Tomlinson

Consulting Engineer

NO one knows just what heat is, so a concept of heat can only be obtained by comparisons. When the cold engine of your automobile is started, by means of mechanical energy, the engine soon warms up. In this case energy has produced heat. But when a steam engine is set in motion it is first necessary to make heat by the combustion of fuel and then to use this heat to evaporate water into steam. Here heat has been used to produce energy. Therefore a concept of energy is needed if we would understand what heat actually is.

Substances and bodies possess energy if they can produce work when their temperature, pressure, velocity or volume is changed. In the illustrations given above work was produced not only by the application of energy but also by the use of heat. Evidently heat possesses the same ability to produce work as energy, so it is safe to conclude that heat is a form of energy.

How Heat Is Created

So far we have noticed two sources of heat—mechanical energy and the combustion of fuels. Three more exist. Heat is created, when electricity flows along a wire, by the resistance to electrical flow set up by the material in the wire. Heat is also formed by the violence of reaction when certain chemicals unite as when water touches dry ice. A fifth source of heat, most important of all, is the sun.

Heat is generated directly in steam boilers by a change of temperature. It is generated indirectly in automobile engines by changes in temperature and pressure. In fans and blowers it is produced indirectly by changes in velocity, pressure and volume.

Heat energy is measured by the British Thermal Unit which is the quantity of heat needed to raise the temperature of a pound of water one degree Fahrenheit.

All gases, liquids and solids have definite capacities for the storage of heat. These capacities depend on the character of the substance and the surrounding temperature. The heat content of these substances rises as the temperature increases. As the temperature decreases their heat content drops. The quantity of heat added or subtracted, when the temperature of the substance changes one degree, per unit weight, is known as the specific heat. The variation in specific heats for gases, liquids and solids is shown in Table 1.

Specific Heat

As it is often necessary to know how much heat must be furnished, in air conditioning, to warm materials, equipment and even people this factor is quite important. Heat capacity may be calculated on the basis of constant volume or constant pressure but, as most air conditioning problems are concerned only with conditions under atmospheric pressure, we are not usually interested in specific heats at constant volume and variable pressure. The specific heat, at constant pressure, for air is 0.239 for a temperature range between 0 and 32 F. A case of the use of specific heat in calculations can be had from the following example. Suppose a certain building enclosed equipment composed of 1,000 pounds of steel and 5000 pounds of wood. If a temperature of 70 degrees is to be maintained under an outside temperature of 32 degrees the total heat which will be absorbed by these two materials in conditioning the building will be:

$1000 \times (70 - 32) \times 0.12$ or 4560 B.T.U.
$5000 \times (70 - 32) \times 0.65$ or 20900 B.T.U.

Total .....35460 B.T.U.

where 0.12 is the average specific heat for steel and 0.65 for wood between 32 and 70 degrees F. In other words over 35,000 B.T.U. must be supplied, plus heat for the air alone, to obtain 70 degrees F.

TABLE 1

AVERAGE SPECIFIC HEATS OF GASES, LIQUIDS AND SOLIDS

SubStance	Temperature Range—Deg. F.	B.T.U per Lb. per Deg. F.
Gases		
Air	32 to 212	0.241
Water Vapor	32	0.448
	212	0.481
Ammonia	73 to 212	0.520
	80 to 392	0.536
Carbon Dioxide	—18 to 45	0.184
	59 to 212	0.203
Liquids		
Water	30	1.010
	100	0.997
	210	1.005
Solids		
Ice	...	0.504
Carbon	52	0.161
Wood	...	0.45 to 0.65
Wrought Iron	...	0.114
Steel	...	0.117 to 0.118
Copper	62	0.092
Brass	...	0.094
Stone	...	0.2 to 0.22
Brick Work	...	about 0.2
Sand	...	0.195

Surprising as it may seem a pound of air holds more heat than a pound of stone, of brick or of sand. A pound of ice holds four times that of iron or steel

TABLE 2

SENSIBLE HEAT AND HEAT OF VAPORIZATION FOR AIR

Temperature— Deg. F.	B.T.U. per Lb. Sensible Heat Dry Air	Heat of Vaporization—B.T.U. per Lb. Dry Air 25% R.H.	50% R.H.	75% R.H.	100% R.H.
0	0	0.3	0.5	0.8	1.0
20	4.8	0.7	1.3	2.0	2.6
40	9.7	1.4	2.8	4.2	5.6
60	14.5	2.9	5.9	8.8	11.7
80	19.3	5.8	11.7	17.5	23.3
100	24.2	11.2	22.3	33.5	44.6
120	29.0	20.9	41.7	62.6	83.4
140	33.9	38.9	77.7	116.6	155.4
160	38.7	75.0	150.0	225.0	300.0
180	43.6	162.9	325.9	488.8	651.9
200	48.4	574.0	1148.0	1722.0	2296.0

It takes less heat for the vaporization of water when the relative humidities are low but more pounds of water can be vaporized in a given time, per unit of heat, at high relative humidities

The total heat in any substance depends on whether that substance is dry or moist. We have seen that air, when dry, contains less heat than saturated air at the same temperature because the moisture in the saturated air also contains a certain amount of heat. The heat in dry air is known as the sensible heat of air and is determined by multiplying the specific heat of air by the dry bulb temperature. In Table 2 its variations are tabulated. Note that the sensible heat represents approximately dry bulb temperature times .241.

Latent and Sensible Heat

The heat in the water vapor is called the latent heat. It is evident that the total heat of saturated air, or of partially saturated air, is the sum of these two heats while the total heat of dry air must be exactly equal to its sensible heat. Naturally the total heat in partially saturated air is less than the total heat for saturated air for the same temperature since there is less vapor present.

For example, the sensible heat for one pound of dry air at 80 degrees is 19.3 B.T.U. and the latent heat for one pound of dry air saturated at the same temperature is 23.3 B.T.U. Therefore the total heat for saturated air would be 42.6 B.T.U. for 80 degrees. If the relative humidity of this air were only 50 per cent its latent heat would be 11.7 and its total heat 31.0 B.T.U.

The latent heat of any liquid is the quantity of heat needed to change a gram of the liquid into a vapor at the same temperature. This form of latent heat is often called the heat of vaporization. The latent heat for solids is the quantity of heat required to change a gram of the solid into a liquid at the same temperature. This form of latent heat is known as the heat of fusion. The conversion of water into water vapor requires the heat of vaporization while the heat of fusion is needed to change ice into water. Heats of vaporization for air at various temperatures and relative humidities are shown in Table 2. A typical illustration of these two heats as well as the process known as "change of state" can be had through changing ice into steam:

Heat to raise 1 lb. ice from 0 to 32 deg. F..... 32 B.T.U.
Heat of fusion to melt 1 lb. ice at 32 deg. F.....144 B.T.U.
Heat to raise 1 lb. water to 212 deg. F. (boiling point) 180 B.T.U.
Heat of vaporization to change boiling water into steam at 212 deg. F..... 970 B.T.U.

Total .....1326 B.T.U.

It not only takes this quantity of heat to turn a pound of ice into steam but it will require exactly the same amount of heat *removal* to convert the steam back into a pound of ice.

Substances which, on combining with oxygen, give off heat are called fuels. Most of the common fuels, such as natural gas, oil, wood and coal, contain carbon. When air is used to supply oxygen for combustion a gaseous reaction occurs which varies with the amount of air supplied. Insufficient or excessive quantities of air always reduce the efficiency of combustion by reactions which produce an oversupply of carbon monoxide gas which is incombustible. A properly regulated air supply gives a reaction which produces a maximum of carbon dioxide or combustible gas. Therefore efficiency in furnace operation requires control of the air supply.

Heat Transmission

Heat is transmitted in three ways —by conduction, convection and radiation. Generally it flows by all three methods at the same time. The laws governing heat movement differ for these methods to a remarkable degree.

TABLE 3

EFFECT OF VARIOUS INSULATIONS ON RADIANT HEAT EMISSIONS

Pipe Material	Insulation	Emission B.T.U. per sq. ft. per hr. per Deg. F.
Galvanized iron	1¼ in. asbestoscell, ½ in. cement and cheese cloth	0.33
IC bright tin	none	1.28
IC bright tin	8 layers 12 lb. asbestos paper	1.28
IC bright tin	7 layers 12 lb. asbestos paper	1.32
IC bright tin	nickel plated and polished	1.33
28 Ga. Galvanized iron	no insulation	1.33
LC bright tin	6 layers 12 lb. asbestos paper	1.39
LC bright tin	5 layers 12 lb. asbestos paper	1.44
LC bright tin	no insulation except ⅛ in. dust	1.44
LC bright tin	4 layers 12 lb. asbestos paper	1.67
LC bright tin	3 layers 12 lb. asbestos paper	1.79
LC bright tin	2 layers 12 lb. asbestos paper	1.88
LC bright tin	1 layer 10 lb. asbestos paper	2.08
LC bright tin	With 2 coats grey paint	2.23

Note: Thickness 12 lb. paper is 0.025 in.

Eight layers of asbestos paper insulation on tin provides the same degree of protection against heat loss as the bare tin itself. This, in itself, is a sufficient indication that asbestos paper is a very poor insulator, but it has the further disadvantage that it absorbs moisture from air and thus is responsible for rapid rusting of tin pipe. [From Nat'l Warm Air Heating Assn., Univ. of Ill. Experiment Station.]

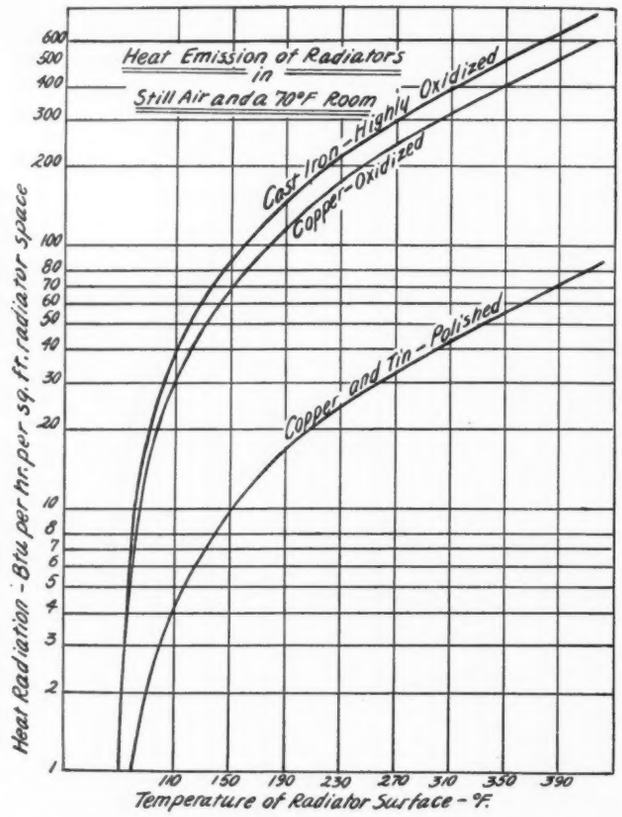


Fig. 1
When the source of heat is oxidized it is more likely to emit a greater percentage of radiant energy than a polished surface

Radiation involves the emission, diffusion and reflection of radiant energy. This energy is emitted from warm or hot objects (the sun is the most important source) in straight lines and travels at 180,000 miles per second. Each ray moves without deviation in its particular path until it strikes a *material* object. It may then be converted into heat and totally absorbed, or it may be partially converted into heat and partially reflected or it may be totally reflected, dependent on the nature of the surface encountered.

Dark and rough surfaces absorb radiant rays and change radiant energy into heat. Light colors and polished surfaces reflect the major portion of the rays received. Air which is either dry or partially humid absorbs no heat from radiant energy but droplets of moisture carried in the air are heated by partial absorption of the rays. In absolutely still air and under gravity conditions a considerable portion of heat is transmitted by radiation. The coefficient, or rate at which this heat is transmitted, depends on the character of the surface and the fourth power of the temperature difference between the hot object and the surrounding cool objects. The rate of radiant heat emission in warm air pipe with various insulation is shown in Table 3. The effect of the condition of common heating surfaces, including oxidation, on emission is illustrated in Fig. 1.

When air moves over material objects it "wipes" heat from hot surfaces and gives up heat to cold surfaces. Transfer of heat in this manner may be accomplished by any gas or liquid and is known as convection. As the air is heated by this method it expands, its weight decreases and it is said to "rise." Colder stratas of air fall because the unit weight is greater than for the warm air. In this manner air currents are set up without mechanical aid.

The rate of transmission for convected heat depends on the temperature difference, the nature of the gas or liquid which conveys the heat, the character of the surfaces which receive this heat and the shape of the objects heated. Convection is responsible for warm ceilings and cool floors. As human comfort is considerably dependent on warm feet and cool heads the most modern types of heating apparatus are planned to hold the temperature difference between floors and ceilings at a minimum by overcoming this natural tendency of convection.

TABLE 4

SURFACE CONDUCTIVITY COEFFICIENTS

Material	Wind Velocity Miles per hr.	Coefficient B.T.U. per deg. F. per sq. ft. per hr.
Brickwork	None	1.40
Concrete	None	1.30
Glass	None	1.50
Smooth wood	None	1.40
Finish of Cement Plaster	None	0.93
Brickwork	5	2.38
Brickwork	10	3.20
Brickwork	15	3.76
Brickwork	20	4.22

Air movement markedly affects surface coefficients of heat transfer. Increase in air movement means an increase in the coefficient due to better "wiping" effect

TABLE 5

CONDUCTIVITY COEFFICIENTS FOR INSULATIONS

Material	Density Lbs. per Cu. Ft.	Mean Temp. Deg. F.	Coefficient B.T.U. per Hr. per Sq. Ft. per in. thickness per Deg. F.
Asbestos sheet	48.3	110	0.29
Dry brickwork	132.0	100	4.00
Damp brickwork	....	...	5.00
Concrete 1-2-4 mix	143.0	69	9.46
Concrete 1-2-4 mix	140.0	110	8.30
Corkboard—no binder	9.7	...	0.32
6-in. hollow clay tile—½ in. plaster on both sides	124.3	105	0.47
Gypsum plasterboard	62.8	70	1.41
Fir sheathing, bldg. paper and stucco	....	20	0.82
Solid gypsum tile	51.8	70	1.66

Variation in insulation coefficients is very great. Closure of porous surfaces and compactness of material gives best results for insulations

Conduction

Conduction is the transfer of heat between parts of an object or between two or more objects in close contact. When one end of a steel bar is heated the heat is conducted rapidly to the other end of the bar. Conduction occurs mainly in solids

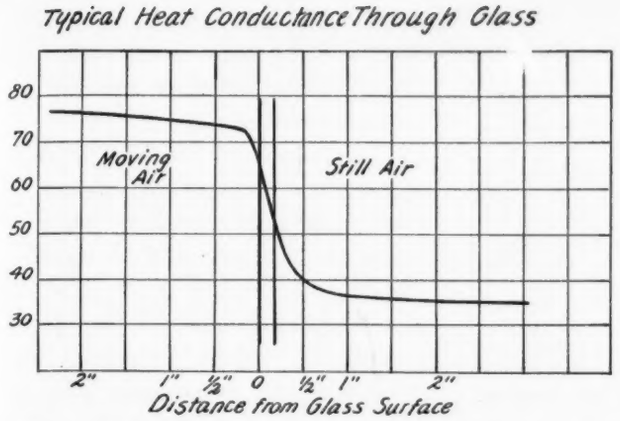


Fig. 2. The "drop" in temperature between the surfaces and the resistance set up by a surface combine to reduce heat flow materially

and in fluids which are at rest. The amount of heat conducted depends on the temperature difference, the length of path, the time, the character of the substance and surfaces and the area or volume of the material object.

In building construction more than one material is usually employed for walls, floors, ceilings and roofing. Furthermore it is often necessary, after a building is erected, to reduce heat losses by the use of insulations. It therefore follows that the coefficient of heat transmission through each portion of the building depends on the coefficients of surface heat transmission, the coefficients of conductance for each material between the surfaces and the coefficients for any insulations which have been applied.

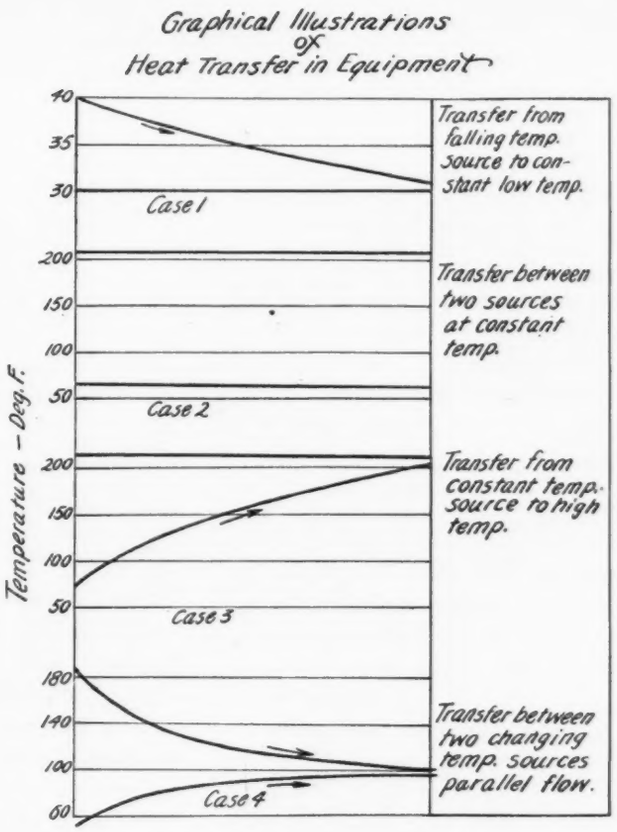


Fig. 3
Heat transfer in equipment can take place in any one of five different ways. For example water is a better medium for heating air than warm air in a condenser where space is limited

Coefficients for conductivity through surfaces, through materials and through surfaces as well as materials are shown in Tables 4, 5 and 6. The effect of surfaces on conductivity may be clearly illustrated by the flow of heat through glass as shown in Fig. 2.

In most cases of expansion and contraction the result is due to the application of heat in the first case and to cooling in the second case.

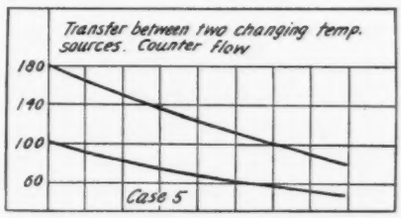


Fig. 3A

Such is not always the case. Water is at its maximum density at 39 deg. F. Whether it is heated above, or

TABLE 6

COEFFICIENTS OF OVER-ALL HEAT TRANSMISSION THROUGH WALLS
(Wind at 15 Miles per Hr.)

Material	Thickness, In.	Coefficient B.T.U. per Hr. per sq. ft. per Deg. F. difference
Brick walls—no finish	Brick—8	0.385
Brick walls—no finish	Brick—16	0.238
Brick walls—½ in. plaster on wood lath	Brick—8	0.250
Brick walls—½ in. plaster on wood lath	Brick—16	0.178
Brick veneer on hollow tile—no finish	Tile—6	0.270
Brick veneer on hollow tile—no finish	Tile—12	0.205
Brick veneer on concrete walls—no finish	Concrete—6	0.387
Brick veneer on concrete walls—no finish	Concrete—12	0.303
Hollow tile and stucco—no finish	Tile—8	0.317
Hollow tile and stucco—no finish	Tile—16	0.195
Limestone walls—no finish	Stone—8	0.556
Limestone walls—no finish	Stone—16	0.385
Concrete walls—no finish	Concrete—6	0.583
Concrete walls—no finish	Concrete—12	0.411
Concrete block—no finish	Block—8	0.458
Concrete block—no finish	Block—12	0.343
Tile walls—no finish	Tile—8	0.490

Finish on the interior or exterior of walls aids in reducing heat losses. Plaster cuts brick wall coefficients 35 per cent and stucco reduces tile wall losses a like amount

TABLE 7

COEFFICIENTS OF EXPANSION FOR GASES, LIQUIDS AND SOLIDS

Substance	Temperature Range Deg. F.	Coefficient per Deg. F.
Gases		
Water Vapor	0 to 141	.00233
Water Vapor	0 to 200	.00219
Steam	0 to 119	.00233
Liquids		
Water		.00011
Solids		
Copper	104	.000009
Brass	104	.000009
Iron	104	.000006
Steel	104	.000007
Tin	104	.000012
Glass	32	.000003
Ice	—4 to 30	.000021
Wood	35	.000002

Note: Coefficients given are for volume of gasses and liquids but linear for solids.

Ice expands twice as much as the metals while wood expansion is at least a third of that for metals

TABLE 8

COEFFICIENTS OF HEAT TRANSFER IN EQUIPMENT

Case	Action	Average Cofficient per sq. ft. per B.T.U. per hr. deg. F.
3	Warming gas by condensing vapor	2 to 4
3	Warming liquid by condensing vapor	150 to 1000
1	Boiling liquid to cool a gas	2 to 5
1	Boiling liquid to cool a liquid	10 to 100
2	Boiling liquid by condensing vapor	400 to 600
4 and 5	Warming a gas to cool a gas	2 to 4
4 and 5	Warming a liquid to cool a gas	2 to 5
4 and 5	Warming a gas to cool a liquid	2 to 6
4 and 5	Warming a liquid to cool a liquid	50 to 75

It takes more heat to cause a change of state for liquids than for gases on a volumetric basis

cooled below, this temperature it expands. A few metals, including iron, also expand when they solidify and contract when they melt. In Table 7 are given coefficients for expansion and contraction of gases, liquids and solids.

Vaporization vs. Evaporation

There is practically no difference between the acts of vaporization and of evaporation for the heat required is exactly the same. Evaporation from the surface of a body of water, for example, is due to the vapor pressure of the surrounding air, the vapor pressure of the water and the rate of air movement over the surface of the water.

The dry bulb of the air directly above the water, once evaporation is started through the rising temperature of the water, gradually drops. When the dry bulb has reached the temperature of the wet bulb, which is the point where the air is at 100 per cent relative humidity, evaporation ceases simply because the air can receive no more moisture. Even in industrial evaporation processes the wet bulb is seldom reached. This temperature lowering simply means that all evaporation is accompanied by cooling of the surrounding air.

We have discussed the mechanics of heat transmission. In all heat transfer equipment, heat is exchanged between gases and liquids by one out of five general methods. These are:

(1) The heat receiving substance remains at constant temperature while the temperature of the heat losing substance drops.

(2) Both substances have a constant temperature.

(3) The heat receiving substance has a rising temperature while the heat loosing substance remains at constant temperature.

(4) Because of parallel flow both substances change temperature—one rising and one falling—and the final temperatures tend to become equal.

(5) Through counter flow both substances change temperature so that the final temperature of one becomes equal to the initial temperature of the other.

The first case may be illustrated by a steam boiler heating water with hot gases, the second by an evaporator boiling a liquid through heat from a condensing vapor, the third by a radiator warming air by condensing steam, the fourth by a radiator warming air through cooling water and the fifth by a brine cooler in which water is cooled by giving up its heat to brine.

Coefficients of heat transfer for these five cases are shown in Table 8 while in Figs. 3 and 3A are shown, graphically, the five methods by which heat transfer takes place between gases, liquids and solids.

It is interesting to realize that all of the movements of heat are directly or indirectly due to solar heat and that the production of cold is just as much a heating process as the production of heat.

The primary purpose of these articles by Mr. Tomlinson is to give readers in practical form the physics principles which must be understood if the contractor wants to be familiar with the "whys and wherefores" of air conditioning. These articles are not intended for "light" reading. Every sentence is packed with meaning. To get the most good from this type of article the reader must be willing to sit down and digest the information word by word. We shall be glad to answer questions or amplify statements which are not understood.

Multiple Inlets—[Continued from page 27]

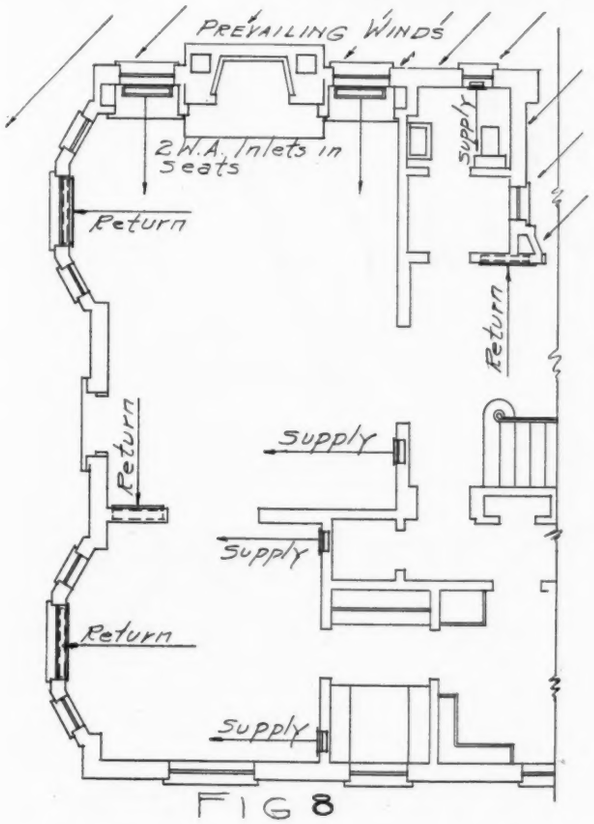


FIG 8

Fig. 8 shows what should be done when prevailing winds are reversed from Fig. 1. The idea is to put supply on walls against which prevailing winds and pressures work and let this pressure carry warm air across the room. Such engineering is practical with fan blast systems, but not gravity, of course

room where children play or adults use exercise machines should have a lower dry bulb temperature, a lower relative humidity, and a higher air movement than a living room where the occupants are normally at rest. The "effective temperature" desired must be the basis for our conditioning.

It is difficult to discuss air conditioning without mentioning "effective temperature." The reader is referred to the article in the AMERICAN ARTISAN of February 1, 1932, entitled "Effective Temperatures," as they will not be explained here.

Authorities do not always agree on just what velocity of air is best for human health and comfort, but we may base our air movement on the average findings. In our living room with the occupants seated and normally clothed, the air movement should be from 40 to 60 feet per minute.

A Practical Solution

Figure 7 is the practical solution for our problem and the inlets were so arranged for the actual job. Our inlets in the window area are a combination of Figs. 4 and 5. The side wall inlets are 7 feet up and are located to sweep the exposed outside walls with a stream of warm air.

Figure 8 would be our arrangement for inlets and returns with our compass points reversed and the prevailing winds from the opposite direction.

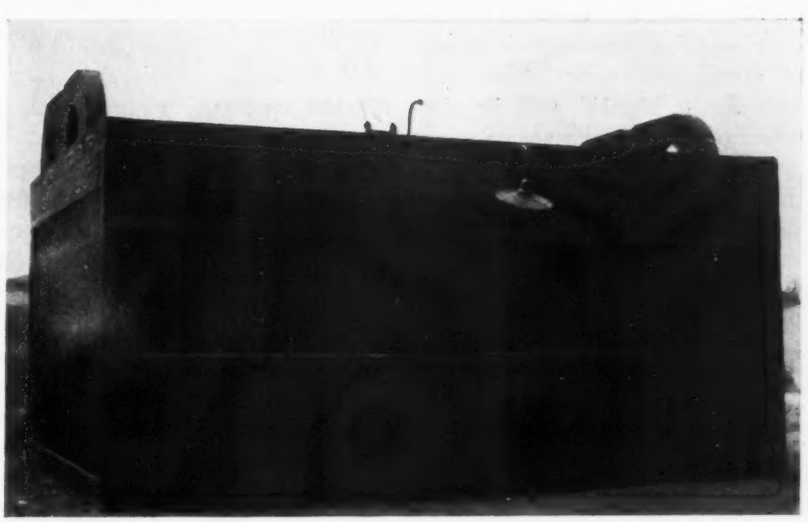
World's Largest Battery—?

THE world's largest battery, located at 7000 Alhambra Boulevard, Los Angeles, is made quite largely of sheet metal.

This great battery is twelve feet wide, eighteen feet long and eight feet high. In fact the thing is so large that there are half a hundred other batteries inside of it.

But, getting down to brass tacks, the big battery is not a battery, strictly speaking, but is the business home of a battery man, J. L. Coffman of Alhambra.

Standing on one of the main highways of southern California, this building is a perfect advertisement of its product, and the motorist whose car has lost some of its vital spark, or is in danger of losing it, knows without being told that a battery man is waiting for him.



Sheet metal has proved its value in wayside business places because it is light, easily handled and easily fashioned into unique designs.

"Remodel with Sheet Metal"

A new campaign idea for the readers of the Artisan, and the copy to put it over

TO WHAT degree are the people of your community aware of the many uses around the home for sheet metal? The chances are that most home owners know nothing more about it other than the fact that guttering and downspouting is the work of the metal worker.

Yet it is in these older homes that the greatest potential market for sheet metal exists today. The whole building industry has been pushing the idea of remodeling for something like three or four years; yet the possibilities in remodeling work remain almost untouched by many of the branches of the building trade.

Knowing this, AMERICAN ARTISAN has created a campaign applying remodeling to the various phases of sheet metal work. "Remodel with Sheet Metal!" will be the slogan of readers who are on their toes, ready to take hold of such a movement and make it known in their communities. Under this banner we will bring you a succession of ideas for advertising and selling efforts which will enable you to secure work in the various divisions of your trade.

The sheet metal industry has, perhaps, an arduous task ahead in getting over to our public the manifold uses of sheet metal, its possibilities for adding utility and beauty to the home. We have not been active in merchandising sheet metal to the consumer. Perhaps the men who represent the retail outlets have not, themselves, realized the importance of the many applications of the sheet metal which they fabricate. In many cases they may not have been fully sold on the merchandising possibilities of sheet metal plus their skill as artisans.

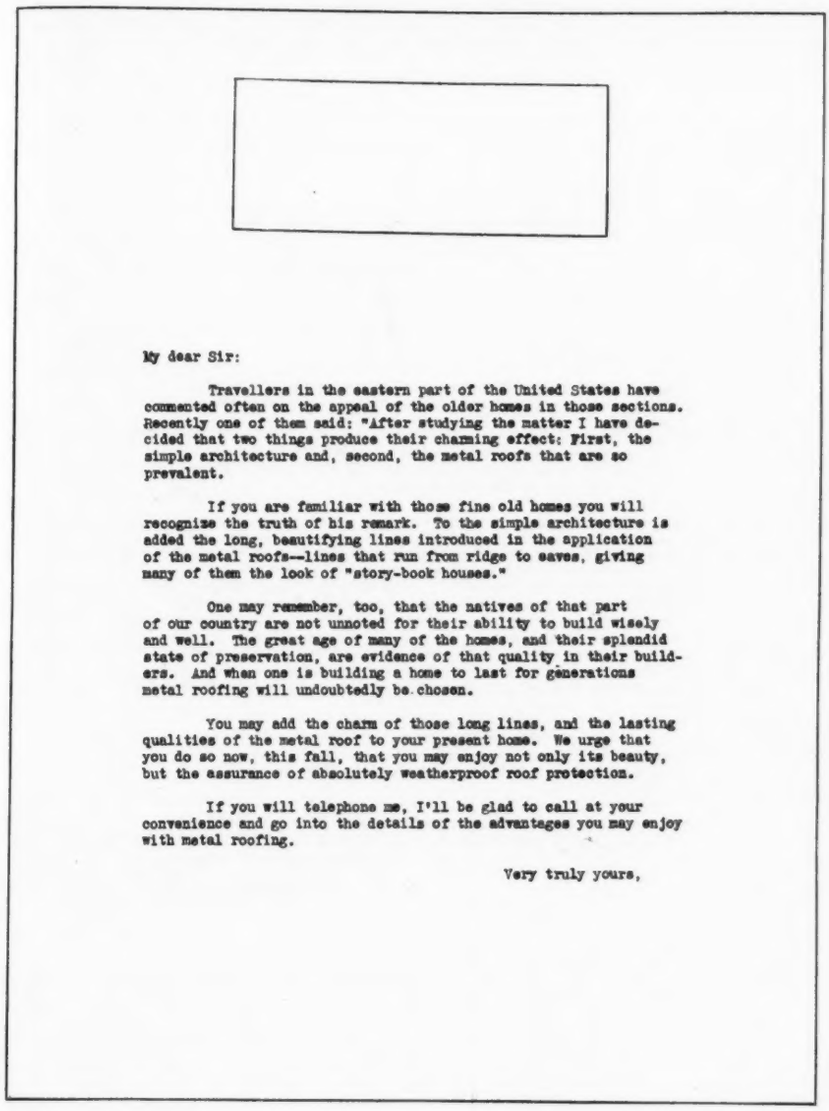
The New Appeal

However, this may be an advantage. The public has had its share, and more, of the merchandising stories of industries which were on the ground earlier and more aggressively. It gives a certain novelty to the appeal which readers of this paper can now make. Home owners have been urged to remodel their plumbing, their heating systems, their floors, their woodwork, the decorative schemes in their homes—but they have not had a consistent push in the direction of sheet metal. The slogan—if you want to call it that—"Remodel with Sheet Metal," is simple, direct, and will arouse interest because it is a new thought. If our readers will undertake to keep that slogan before their communities we may logically hope that it will create business. Various efforts on the part of other units in the building field have found such remodeling efforts profitable.

We urge, therefore, that it be incorporated in sales letters, newspaper copy, circulars, in somewhat the fashion we have followed in the sales letters and newspaper advertisements which are included in this article.

The first section of our campaign is on tin roofs. We have felt, for the purposes of advertising, that "metal roofs" is the better term, and those words are used throughout. They may be changed, of course, by any reader making use of the copy who prefers the other term.

Note that the sales letters and



My dear Sir:

Travellers in the eastern part of the United States have commented often on the appeal of the older homes in those sections. Recently one of them said: "After studying the matter I have decided that two things produce their charming effect: First, the simple architecture and, second, the metal roofs that are so prevalent.

If you are familiar with those fine old homes you will recognize the truth of his remark. To the simple architecture is added the long, beautifying lines introduced in the application of the metal roofs—lines that run from ridge to eaves, giving many of them the look of "story-book houses."

One may remember, too, that the natives of that part of our country are not unnoted for their ability to build wisely and well. The great age of many of the homes, and their splendid state of preservation, are evidence of that quality in their builders. And when one is building a home to last for generations metal roofing will undoubtedly be chosen.

You may add the charm of those long lines, and the lasting qualities of the metal roof to your present home. We urge that you do so now, this fall, that you may enjoy not only its beauty, but the assurance of absolutely weatherproof roof protection.

If you will telephone me, I'll be glad to call at your convenience and go into the details of the advantages you may enjoy with metal roofing.

Very truly yours,

the newspaper advertisements have been written in pairs. That is, each sales letter and its accompanying newspaper copy have been developed around the same sales appeal. This is always good practice because it has the value of repetition. The prospective customer who has seen a sales idea in a letter reaching him at his home, and then picks up his newspaper to see the same sales idea, will remember it.

In preparing this sales copy it will be noted that we have stressed very strongly the elements of "style" and "distinction." We believe these to be good sales appeals, particularly since the woman is always interested in possible improvements to the home. Women have their sense of style — which for them is the same as distinction—highly developed, and will react more quickly to that sales argument than they will to something more practical.

How to Use the Copy

We want to point out that the copy which is being furnished from month to month in these articles is not necessarily confined to the particular form in which they appear. For example, any of the copy which appears in the three sales letters may be used, for example, in a circular. Similarly, the copy which appears for the newspaper advertisements will be equally valuable if it is used for an envelope stuffer or for a blotter.

In addition to that, it is worth while to read the copy carefully and to remember the chief sales arguments advanced. Such material is also usable when you are talking face to face with a prospect. In every sale—at least in many sales—there comes a point when the whole affair seems to be at a standstill. The prospect has, perhaps, advanced a few objections to buying now, and the dealer has met those. But as yet his prospect shows no sign of being ready to tell the dealer to go ahead with the work.

Sales Conversation

One can never be sure what is going on in the prospect's mind. But the dealer does know that he has not received a definite turndown. The prospect may be turning over in his mind certain conditions which he does not want to make known to the dealer—he may be "figuring up" mentally what he has to pay out that month, or he may be balancing against the job the dealer is urging something else which he has been thinking of buying. At such times a little of what we might term "sales conversation"

▲

Here is Letter No. 1, and its accompanying ad—the opening guns in the campaign

Would You Like a Roof of Distinction?

Have your home reroofed with sheet metal. Then you will have positive weatherproofing, plus a distinction that will make your home stand out vividly from those around it. The long lines introduced in applying the metal roofing run from peak to eaves — and the roof may then be toned perfectly in keeping with the rest of the exterior, giving beauty, utility and a generation of use, inexpensively.

(Your Name)

is invaluable to fill up the gap. If the dealer has his sales points well in mind, he can make conversation for a little time, repeating some of his arguments, going over the ground again, and thus adding to the pressure he has already applied.

The third letter which appears in this article is addressed to the architect and should be sent to the men of that profession the dealer is contacting. They may not be aware of the developments spoken of in the letter and should, therefore, be interested in them. The newspaper advertisement which accompanies it uses the same arguments but is, of course, written for the home owner.

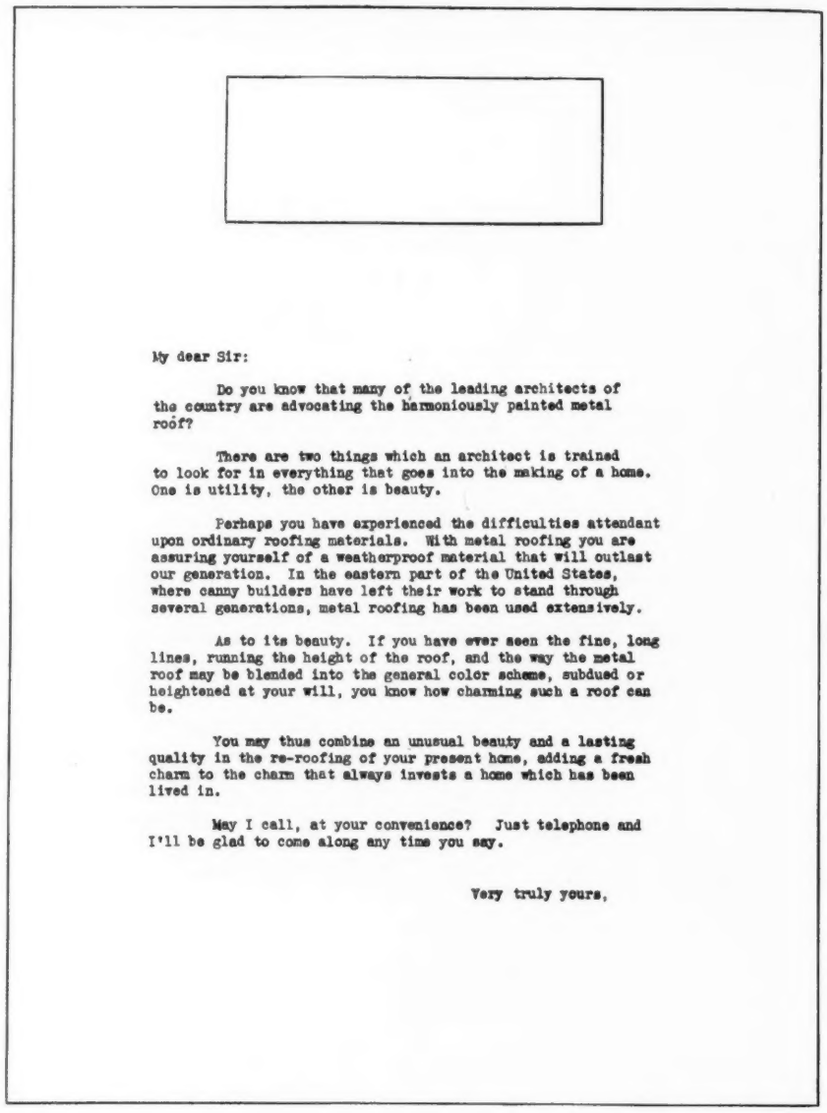
In line with the recommendations carried in our August issue, in connection with the "Ten Best Prospects" sales plan, it might be well for the dealer to make a selection from his total prospect list of those to whom he feels he has the best opportunity of getting somewhere on this proposition of metal roofs.

The idea of the metal roof can be very well presented where, whatever the circumstances, there is a group of buildings involved. This might be a private estate, a small housing development now some years old or even a group of small commercial buildings. In such cases the possibility of a greater uniformity in the appearance of the group of buildings and savings in maintenance cost will be of undoubted interest to the owners or proprietors.

Be Sure to Follow Through

At any rate, the two letters addressed to home owners should go to a selected list on the first mailing, not too many in number. This will give the dealer an opportunity to give each of those prospects a personal follow-up, either on the telephone, or through a personal call. In this way he will be sure that if his letters have aroused any interest at all, he will be on the ground to develop it and to capitalize on it. A whole list may be worked in this way, taking a small enough group each time, and religiously following up the letters with a personal contact.

We suggest, of course, that the dealer secure from the manufacturer any literature on metal roofing which is available, to be enclosed with these letters. This will do a great deal to back up the suggestions contained in the letter, adding the manufacturers' prestige to the



My dear Sir:

Do you know that many of the leading architects of the country are advocating the harmoniously painted metal roof?

There are two things which an architect is trained to look for in everything that goes into the making of a home. One is utility, the other is beauty.

Perhaps you have experienced the difficulties attendant upon ordinary roofing materials. With metal roofing you are assuring yourself of a weatherproof material that will outlast our generation. In the eastern part of the United States, where canny builders have left their work to stand through several generations, metal roofing has been used extensively.

As to its beauty. If you have ever seen the fine, long lines, running the height of the roof, and the way the metal roof may be blended into the general color scheme, subdued or heightened at your will, you know how charming such a roof can be.

You may thus combine an unusual beauty and a lasting quality in the re-roofing of your present home, adding a fresh charm to the charm that always invests a home which has been lived in.

May I call, at your convenience? Just telephone and I'll be glad to come along any time you say.

Very truly yours,

Letter No. 2 and its companion newspaper ad, continuing the message of lasting beauty

Remodeling?
Start with
the Roof

Wouldn't you like a roof that would be distinctive and unusual—different from anything in your neighborhood? We suggest re-roofing with sheet metal. No other material will give you at once the generation of weatherproof security and great beauty that metal roofing will. We've made a specialty of metal roofing and can assure you lasting satisfaction and the distinction of difference.

(Your Name)

claims contained in the letter and giving the prospect something to keep his attention on the subject of metal roofs for a longer time than would be occupied if he had merely the letter to read.

Many retailers have no real conception of what is meant by a sales idea, so it is worth while to look over the copy which is included in this article and to study it to see just what can be used when you are talking or writing about a product.

Take the Sales Letter No. 1, for example. The main idea in this letter is the fact that the older homes of the eastern part of the country are roofed with metal. Now it happens that while we were discussing metal roofing and what were the best sales arguments about it, one of the members of the staff said just what you find quoted in the first paragraph of that letter. That quotation is there because we all instantly appreciated that it was something very favorable to be said about metal roofing, that is—not only because metal roofing lasts, a thing which we all knew, but because we could tie its lasting quality up with the historic eastern section of the country.

From that to studying the photograph of the house published in the last issue of the ARTISAN, showing a fine home with a metal roof, and describing just what we saw, we come to the second part of our sales argument.

The point we want to make is that a sales argument, whether it's used in a letter or in talking to a prospect, isn't anything mysterious. Very often the most casual thing you can say about a product will be the most powerful sales argument for it. And we would advance this rule for the dealer who wants to try his hand at getting together his own sales letters: When you come to write the letter, write it just as if you were talking about the product. Then you will have a letter that will read easily and convincingly.

We ask, by all means, that any of our readers making use of this material let us see copies of it, and keep in touch with us with a view to reporting results. We believe an aggressive campaign at this time to "Remodel with Sheet Metal" can be put over in great style. In following articles we will carry the idea into the other uses of metal, so that our readers will have a well-rounded campaign to go forward with under this new sales idea.

▲

The letter is for architects. The ad is, of course, for the general public in this campaign to "Remodel with Sheet Metal"

Dear Sir:

I am informed that many of the leading architects of the country are advocating the harmoniously painted metal roof.

As you know, we have made somewhat of a specialty of roofing. Metal, properly laid, is positively weatherproof. It adds a touch of distinction to the home because of the long lines, running from ridge to eaves, and may be treated so that it blends perfectly into whatever color scheme is desired for the exterior of the building.

You will be interested to know that I am calling these facts to the attention of home owners here, in connection with a general campaign, designed to urge that home owners "Remodel with Sheet Metal."

I shall be glad, of course, to furnish any information you may require, whether of a general nature, or with reference to a particular job.

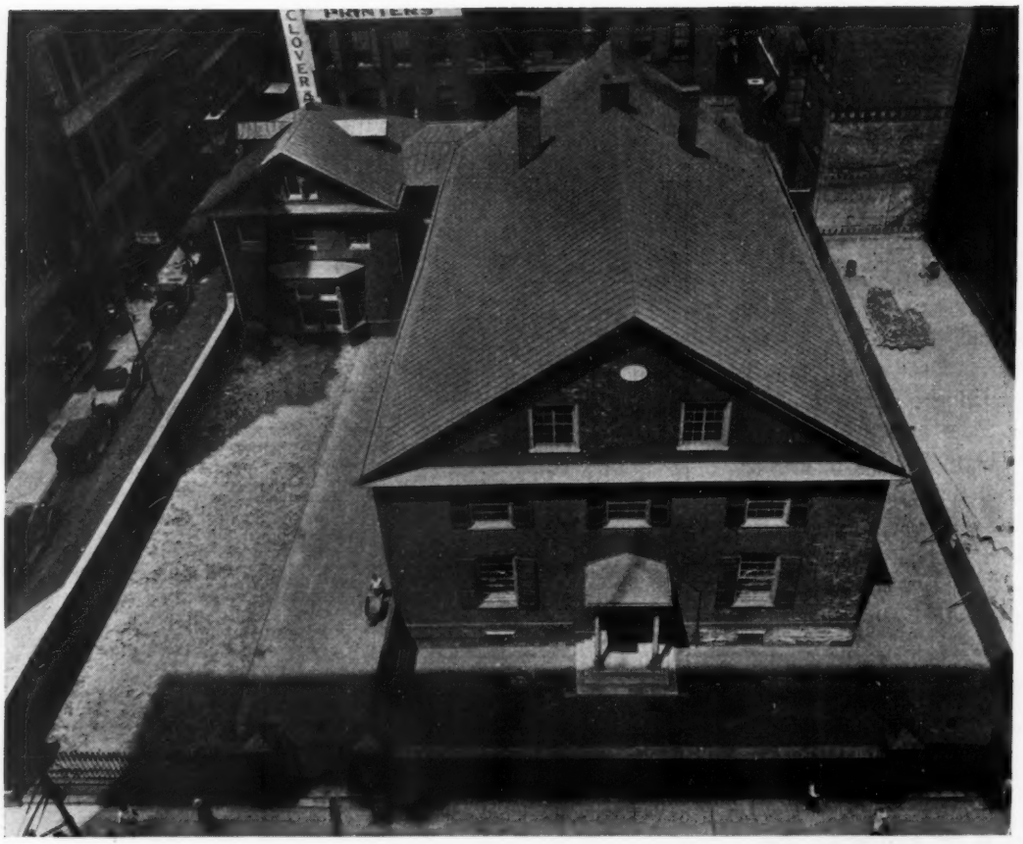
You have only to telephone me.

Very truly yours,

Beauty and Long Life with Metal Roofing

Metal roofing meets today's demand for utility, beauty and lasting value. It will add a note of vivid distinction to your home, will assure you of permanently weatherproof material, a material that will outlast a generation. That's why so many of the homes in the east retain their fine state of preservation—they were roofed with sheet metal and have resisted the wear and tear of generations.

(Your Name)



Modern Tin Roof Protects Historic Philadelphia Building

HISTORIC old Friends Meeting House in Philadelphia has a new tin roof.

This old structure, in the heart of Philadelphia's business district, was built in 1812—120 years ago. The building, like many other Philadelphia structures of that time is brick, of Colonial architecture, three stories in height and covered with a double pitched roof. When built the house was one of the largest structures in the country.

The roof of the building when built in 1812 was covered with cypress, weather-dried shingles of large size. These shingles were often referred to in the writings of such prominent men of the period as Benjamin Franklin, Stephen Girard and others, as being one of the best types of roofs then known.

These shingles, with necessary repairs, lasted until 1898, when extensive repairs were required. Due to a city ordinance of that time which prohibited shingle roofs in the business district because of the fire hazard, wood shingle replacement was out of the question so the 1898 roof was tin. The tin used was either the "Melon" or "Talbot" brand, imported from Wales.

It is interesting to note that in 1898 all roofing tin was brought from Europe in sailing vessels as ballast and free from duty. It is also interesting to note that there are many tin roofs in Philadelphia still covered with this imported tin and in most cases the roof is still in an excellent state of preservation.

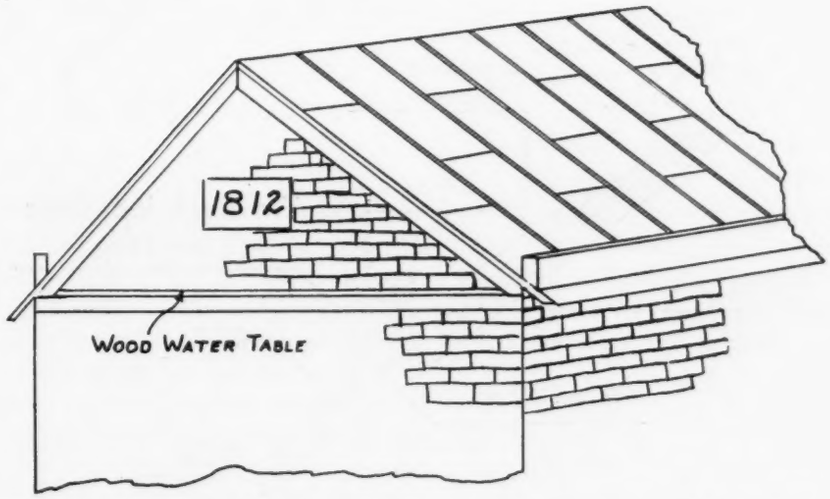
Early this year a number of old buildings adjoining the Meeting House were torn down and the plot used for a 30-story office building of the Philadelphia Saving Fund Society, one of the oldest and largest savings banks in the country, if not in the world.

Through some unknown reason, but probably because of the high buildings surrounding the House, a wind suction was created on windy days. Eventually this suction lifted and tore loose from the cleats nearly half of the 1898 tin roof. Examination of the old tin showed it to be in good condition despite 35 years of service.

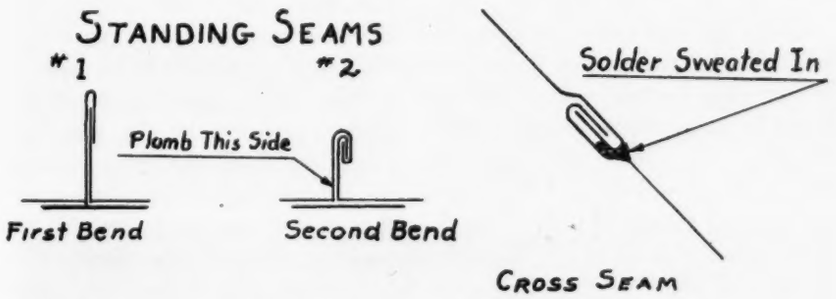
A new tin roof totaling 8,000 square feet in area and laid standing seam was contracted for. The new material is 40-pound, copper bearing, open hearth tin. The contractor is William T. Tomlinson and Company, of Philadelphia, one of the city's real old time tin roofers. Mr. Tomlinson has been a sheet

metal man for some 46 years, first as a mechanic and later as a contractor and has placed many tin roofs all over the city. The new roof is a credit to him and his mechanics.

Mr. Tomlinson insists that tin is still the best roofing material. He is also positive that correct laying of a tin roof is an art and like all arts is circumscribed by strict construction rules which cannot be violated. For instance, special attention is paid to the selection of the proper irons, solder and flux and correct "putting" of the sheet tin in rolls for the roofer.



The tin roof is laid standing seam with all cross seams soldered for tightness. The gutter stop above the eave is built up on a heavy wood strip. Some 8,000 square feet of tin were required



Special attention was paid to the seams. All standing seams were plumbed along the back side to insure good appearance. Cross seams were sweated in with solder. Short nailing cleats were used in the standing seams

All cross seams are soldered by sweating to insure permanent tightness. The mechanics are also instructed to be sure that all rosin, which is used as the flux, is removed from the sheet because globules of flux eventually come loose and carry with them the paint which protects the metal.

The roof is laid standing seam, with each sheet fastened with two cleats folded into the seam. No

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IN CONNECTION with the laying of the new American tin roof on this venerable old building, it might be well to reflect back to the year in which this building was built 120 years ago, and compare business conditions and national affairs then with the present. At that time our country was at war, and in much worse condition than now.

It was on March 3, 1811, that the United States bank closed its doors and ceased to exist, leaving the Government without the fundamental necessities of an adequate circulating medium or a means of selling its credit.

In 1812 the Federal Treasury was on the verge of bankruptcy; money was needed immediately for the conduct of the war; Congress opposed the levy of internal taxes, fearing the people who were in an ugly mood, and authorized the Secretary of the Treasury to negotiate a loan of 16 millions of dollars. (We talk billions now.) Early in 1813 the loan was advertised; subscriptions to be received at designated banks in twelve different cities.

The response to the loan was disappointing. On the first call less than 4 millions were subscribed. Another appeal was made in March, 1813, and less than 2 million was taken, and the final results from this loan was so meagre that on the 1st of April, 1813, the Treasury of the United States was practically without funds to prosecute a war and resurrect business.

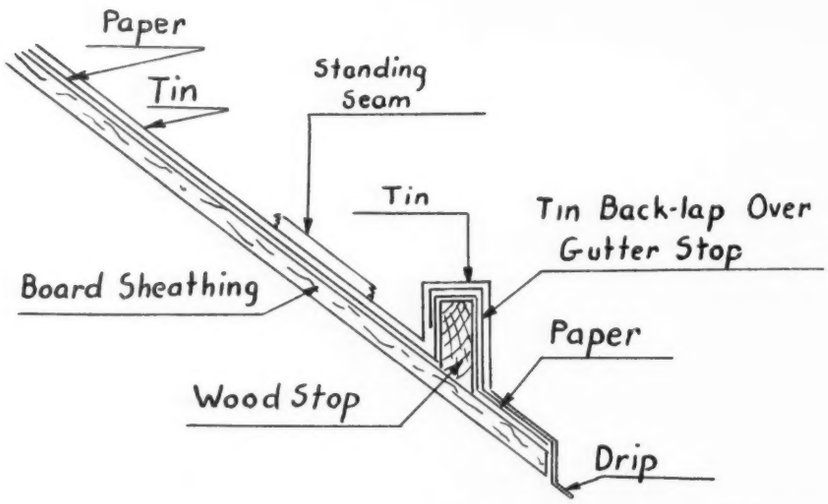
Then it was that a few business men placed their all, without any hope of return, at the disposal of the Government and the war was won.

The period following the war of 1812 was one of commercial depression, scarcity of specie and general hard times. Banks found difficulty in meeting their obligations and European trade was at a standstill.

It was then that business men petitioned Congress for a charter for a Second United States Bank and brought all the pressure they had to bear to accomplish their aim. When the subscription books were opened there was a deficit of 3 millions of dollars in the subscription of stock, but again these men on the last day were able to find subscriptions enough to take the balance of the stock, and the second United States Bank was a fact.

While the Second United States Bank had its troubles thereafter, mostly in management by political appointees, it was not long before the example of these men of faith had the effect of bringing our country through the worst period of our country's history, 1812-1817, before or since.

It was in this same period that the Friends, having faith, built this building, one of the country's then largest buildings, which now has been covered with an American tin roof, during hard times, by a busy roofer.



The metal is laid on a full board sheathing, covered with paper. Especial attention is called to the metal fabrication at the gutter stop. The standing seam is cut off above this stop

nails are permitted through the sheet. Because this roof has a large expanse of metal on both sides of the ridge, an ugly appearance might have been secured if the seams were carelessly plumbed. Mr. Tomlinson insisted that each seam be exactly plumb—an operation done with the groover and mallet. Standard, two-fold forming was followed.

Along the eave and some distance back from the roof edge there is a gutter stop formed over a heavy wood beam as shown in one of the details. The sheets were brought to within a few inches of this stop as standing seam and then changed to double locks. The sheet which forms the gutter was carried over the stop, down to the edge where a drip was formed and turned back under and over the stop. Construction is indicated in one of the details.

The metal was covered with a paint made from oxide of iron mixed with linseed oil.

Considerable interest was aroused when Mr. Tomlinson found that one of his mechanics had helped to lay the 1898 roof. This mechanic still believes that tin is the best material, an assertion which is borne out by the maintenance records of the 1898 roof. Records show that in the 35 years the roof was in place the total maintenance cost has been less than $1,100. This included periodic inspection and painting. On an annual basis, this is $30 a year for a first class roof of 8,000 square feet. This surely is quality at low cost.

This maintenance record is made more impressive by the fact that there have been numerous fires in the old buildings of the crowded section around the house yet this tin roof has given fire protection as well as weather protection during these years.

Tin roofs add to the dignity of residences when the roof is laid by a competent contractor. On residences the metal can be painted practically any color to harmonize with the color scheme of the house or its surroundings

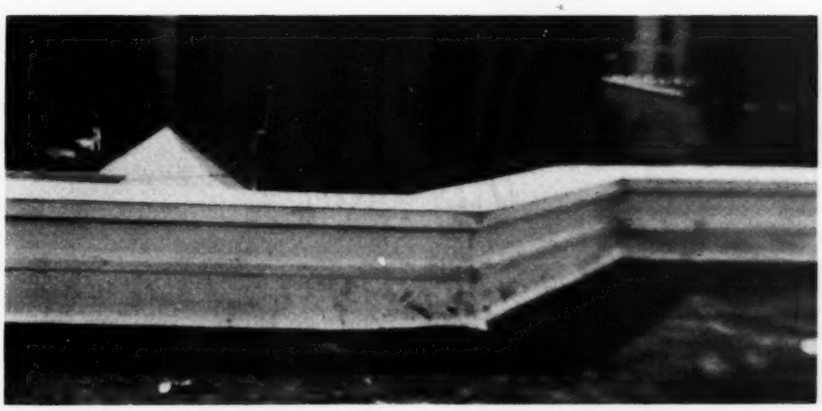
To the left is another tin roof project completed a few months ago in Philadelphia. This is the roof of a branch bank of the Philadelphia Saving Fund Society. Construction is very much like the installation discussed here

A Coping Cap

IN these times when all property owners are trying to conserve their buildings and at the same time save repair expense, the sheet metal contractor is finding many places on commercial structures where his skill can save money.

A typical example of this profitable line of activity is cited by George Linke, sheet metal, roofing and heating contractor of Milford, Ohio. Mr. Linke describes the problem which confronted him and sends us a sketch showing just how the problem was handled.

The coping is around the roof of the Milford Town Hall. The exterior wall covering is stucco which is carried to the top of the coping.



The photograph and drawing show the construction and appearance of this coping cap

The wall is brick and originally did not have any protecting cap. Water seeped behind the stucco coat and upon freezing broke off pieces of the stucco. The wall above the roof was relaid in cement mortar a few years ago in an attempt to prevent water penetration, but this plan did not eliminate the trouble.

The roof behind the coping is asphalt laid on concrete with the asphalt carried up the back face of the coping in a self-flashing edge. After some years of life this upstanding edge curled away from the wall, permitting water to work between the asphalt and the concrete, resulting in further trouble.

As Mr. Linke sized up the problem, what was needed was some sort of a metal cap which would turn water away from the outside stucco face of the wall and also carry water onto the asphalt and not behind it.

A wall covering of three sections was devised as shown in the cross section. One of the real problems was to fasten this metal cap in place because the concrete mortar could not be nailed into, nor could a flashing be held on the concrete roof.

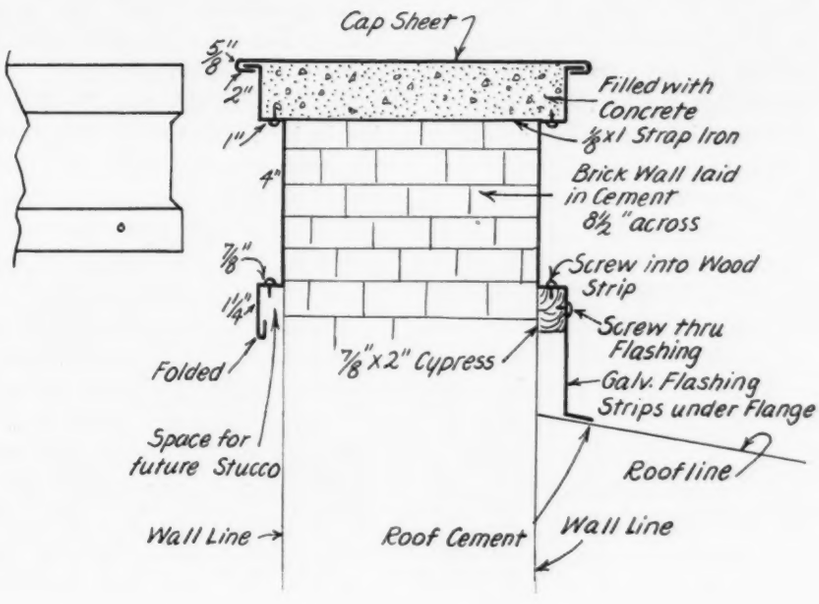
The cap devised consists of a top sheet and a front and back side flashing sheet. The two side sheets were made higher than the wall. The front section was formed with a square angled drip which extends out over the stucco and another projection beginning at the top of the wall and extending 2 inches above the wall top. The 1-inch brake was made not quite square so that when the three sections were bolted together the spring in the sheet held the front section tight against the stucco.

The back section was formed like the front section with the lower end held by screws into a wood nailing strip. A flashing sheet was inserted behind the lower edge of this section and carried down over the asphalt to end in a projecting lip for drainage onto the roof.

The front and back sections are held together by a ⅛ by 1-inch galvanized strap which rests on the top of the wall. The two 1-inch projecting bends of the front and back sections provide a space two inches higher than the wall and a projection of one inch from both wall faces. After the strap was bolted on with galvanized bolts this space was filled with concrete which serves to cap the wall and also provides weight to hold the metal cap on the wall.

When the concrete had set, the cap sheet was put over the lips of the side sheets and locked tight.

Galvanized iron of 26-gauge was used for the cap. Some 220 feet of capping was required for the job.



The "Ten Best Prospects" Sales Plan

as announced in our last issue has met with enthusiastic response. We continue in this issue the work of calling to readers' attention the products they can sell under this plan : : : : : : :

MY BEST PROSPECTS ARE—

In the form below, write the names of just ten prospects you know have money they could spend for your service. This page tells you how to use the list:

Prospect No. 1.....
Should buy.....
Prospect No. 2.....
Should buy.....
Prospect No. 3.....
Should buy.....
Prospect No. 4.....
Should buy.....
Prospect No. 5.....
Should buy.....
Prospect No. 6.....
Should buy.....
Prospect No. 7.....
Should buy.....
Prospect No. 8.....
Should buy.....
Prospect No. 9.....
Should buy.....
Prospect No. 10.....
Should buy.....

IN our August issue we announced this "Ten Best Prospects" sales plan. In doing so, we felt that we were offering our readers the only practical working plan which can be followed today. For one thing, a man can no longer think in terms of big mailing lists. He has to reduce his prospects to those whom he has reason to believe can purchase something which he has to offer. In that way he keeps his costs down and he concentrates on those people who can buy. For another thing, this plan clarifies for him his selling job. Let us suppose that a dealer has a list of only two hundred names. Let us suppose that there are, say, fifty items which he has to sell. That combination of fifty items and two hundred names means a simple combination of one thousand sales possibilities—and the man doesn't live who can think clearly about one thousand things.

By following this plan, the dealer breaks his list down into groups of ten—each group containing ten people, about each of whom he knows two vital things: first, they have the money to buy, and second, he knows they have a definite need.

The form on this page is for the convenience of our readers in listing these prospects. After the ten names have been put down, on the "should buy" line under each one the dealer enters the product in this, or the August issue, for which each prospect has a need. He may, for example, find that one prospect ought to have an auxiliary furnace (Fig. 11), or a roofing job (Fig. 3), or both. When he has entered these products he sees clearly that he has ten, twenty, thirty, or even more, sales possibilities, and he knows where those possibilities are.

From that point on he can spend what he wishes. He can handle the entire matter by telephone or personal calls, or he can start a series of personally-written letters, each one applied accurately to the prospect's needs. He can spend as little or as much as he desires, yet develop these sales possibilities fully whatever he does, because he knows just what he's shooting at.

NOTE: Each product on the following pages has a Figure number. Under that number, on Page 49 will be found the manufacturer's name.

More Products Furnace and Sheet Metal Men Have to Offer Customers or Prospects

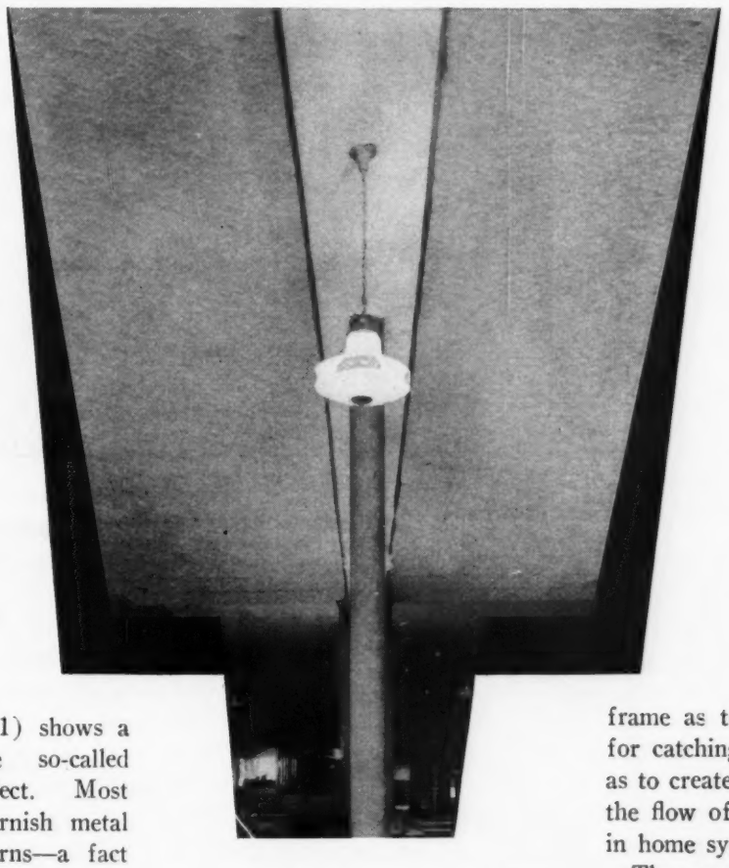


Fig. 1—Metal ceilings, which may now be had in modern designs, — offer sales possibilities

THE picture (Fig. 1) shows a ceiling with the so-called "Spanish plaster" effect. Most manufacturers now furnish metal ceilings in small patterns—a fact which the prospect may be ignorant of, thinking still of metal ceilings in terms of the old large squares which will not appeal to the modern eye.

A nice volume of such business may be developed in commercial buildings, in restaurants, dry goods stores, clothing stores, etc. In the older buildings, particularly, they offer an economy to the owner. Where the plaster is loose, and the owner is under the necessity of redecorating, the metal ceiling may be applied over the plaster. It is permanent, can be painted and washed and in this way made to cut down decorating costs. In homes, the metal ceiling has an especially fine application—remembering the modern type of pattern—to kitchens, bathrooms, porches. In old flat or apartment buildings, the owner will be interested in the economy appeal because with such ceilings the maintenance cost is greatly reduced.

Air Filter

In Fig. 2 we show an air filter. It is constructed of an all metal frame with expanded metal front and back. The filter media is a tough, springy hairlike material. It is said to be so packed into the frame as to offer a large surface for catching dust, but so designed as to create very little resistance to the flow of the air. It is for use in home systems.

The economy afforded the housewife during the long winter months by the use of air filters is obvious. Dust that is caught in such appliances will not be carried into the living rooms to grind out the lustre and the life of rugs, drapes, curtains, upholstery or furniture finishes. With the growing interest in forced air systems of heating, the possibilities of air cleaning by filtering comes strongly to the fore. Owners of such systems already

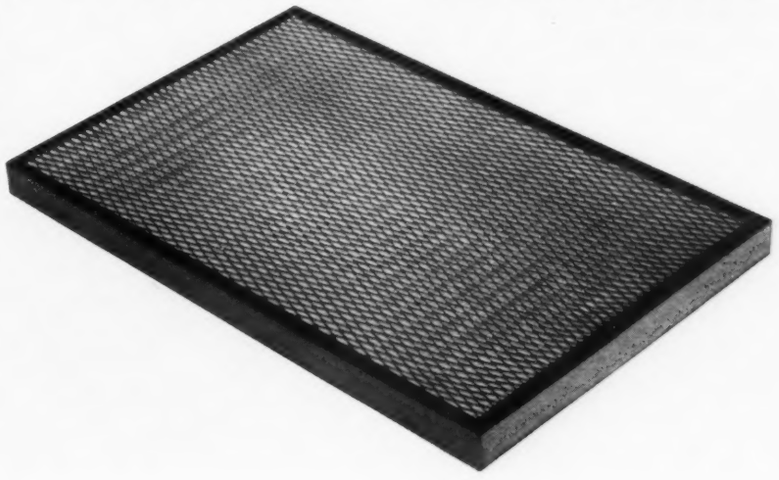


Fig. 2 — Filters for forced warm air systems will be in demand with winter coming on

installed will be interested in the story of greater cleanliness in the home, and smaller cleaning bills.

Modern Metal Shingles

As is the case with metal ceilings, modern metal shingles may be had in the conventional shapes, as shown by the picture (Fig. 3), or they may be had in tile shapes. For the home owner they offer the security of fire resistance. Once applied there will be no trouble due to having a high wind carry them off the roof. They are moisture proof and may be laid over the old composition roofing, just as the workman is seen doing in the photograph we reproduce. Whether on homes or on commercial or industrial buildings, metal shingles have the same advantages.

Fig. 3 — Above: Laying metal shingles over the old composition type

Fig. 4—Left: A new blower unit which comes "ready to run"

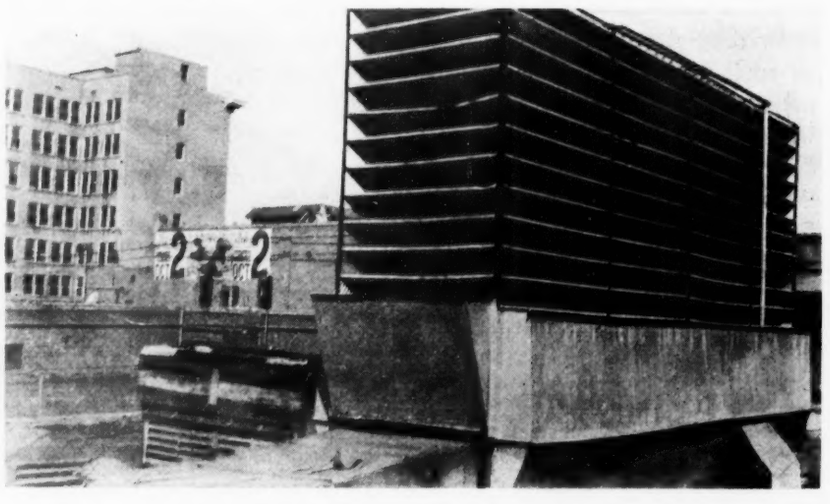
A New Blower Unit

There can hardly be a literate man or woman in the United States who is not aware of the fact that warm air heating has advanced rapidly in the direction of air conditioning; and though your list might not have in it a prospect to whom you want to talk air conditioning, there must be a number of your older customers, with gravity systems, who would listen with a willing ear to the story of controlled distribution. The blower unit shown in Fig. 4 is a new one. It comes "ready to run," and can be attached to any make of warm air furnace.

Cooling Towers

Look around your community and you are almost sure to see a variety of cooling towers on top of commercial buildings. Many of them are constructed of wood. Water rots the wood and ultimately the tower falls to pieces and has to be replaced. With a tower constructed of metal, it is durable and can be kept in good repair by merely painting. It has, too, the advantages of better appearances on its side. Fifteen to twenty per cent of all industrial buildings have cooling towers and

Fig. 5—Look for wood cooling towers—to be replaced with metal towers



owners will appreciate the value of the investment in long-time use with low maintenance cost. Fig. 5 shows a metal cooling tower put up by a reader of the ARTISAN. Let at least one of your "best prospects" be a commercial or industrial house.

A New Air Conditioner

With all that we have published in our columns on the subject of air conditioning, there is no need to bear down heavily on the possibilities of this market that is opening to dealers in the heating field. If it is true that, at the moment, air conditioning is not to be thought of as a mass possibility—and that is not altogether certain—then our system of selecting the best prospects in the community applies most aptly to the sale of air conditioning equipment. In Fig. 6 we show a new unit, moderately priced, which is described as a "washed air conditioner." By means of automatic controls, the equipment is intended to keep the air in the home uniform throughout the year. It has twin filters, twin blowers, an air washer and a humidifier incorporated in the unit. It is equipped with room thermostat, furnace control and acquastat as standard.

It is important to note that this unit is designed for use also with steam or hot water systems, as well as with any furnace already installed. The two filters operate successively, the first, or primary, filter removing the larger dust particles, and the second filter removing finer dust particles.

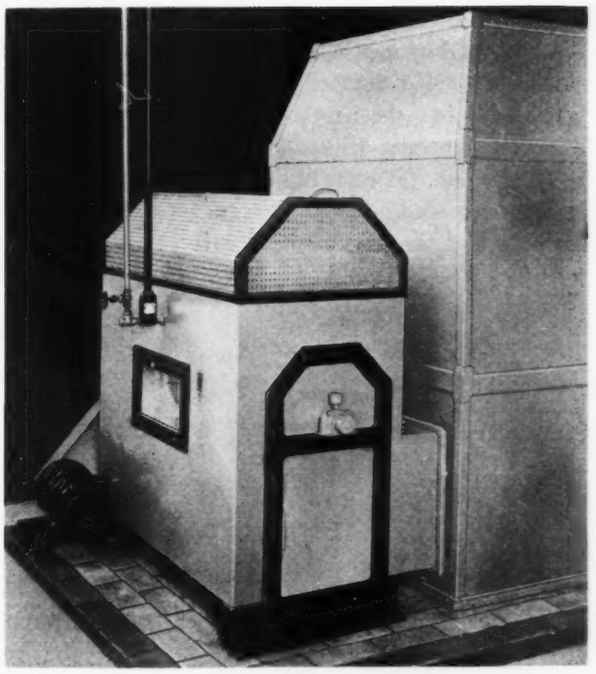


Fig. 6—A new air conditioning unit which may be used with warm air or steam and hot water systems

Metal Tanks

In one of the earlier paragraphs of this section we said that selling is a matter of personal initiative in recognizing possibilities, and going after them. The photograph, Fig. 7, is a good illustration of what we mean. Here is a concern with several shop-fabricated tanks standing outside its place of business. Somewhere in every community there is a need for special purpose tanks. It may be as obvious as the possibilities that exist in the oil fields, and it may not. Take rural districts, for example. We know of one sheet metal contractor who has done a nice business in fabricating tanks for watering stock.

It is one of the possibilities which should be borne in mind while studying this plan of selecting prospects to which some phase of the sheet metal man's services may be sold. It is, perhaps, in this type of selling to keep the shop busy that

Fig. 7—Who needs special tanks in your community? This shop makes them

initiative will show up most clearly. We have told of men who found it possible to sell a number of items fabricated in the shop—flower boxes, automobile driveway curbing, and so on. It certainly can do no harm to study the capacity of the shop and the possible needs of

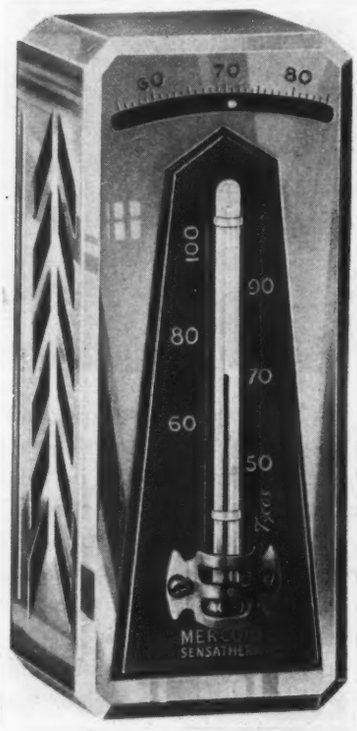


Fig. 9—A room thermostat both beautiful in design and accurate in holding temperature at the set point

the community for special tanks, or other metal work.

Controls

Perhaps there is no other one thing in heating about which the public is more conscious than the possibility of control. Men and women who have suffered from great fluctuations of temperature in the home have learned that such fluctuations need no longer be endured. This, and the introduction of automatic heating methods, has made the subject of heat control one about which the dealer may talk with the assurance of interest. In Fig. 8 we show two temperature control units. One is the ordinary room thermostat; the other a day-and-night instrument. The room thermostat was designed pri-

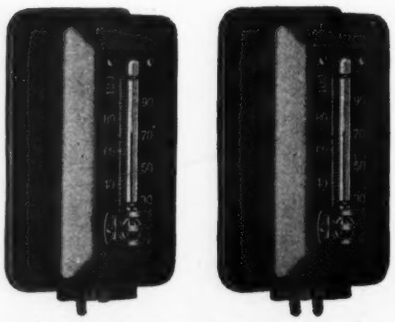


Fig. 8—A room thermostat, and a "day and night" control that give accurate control

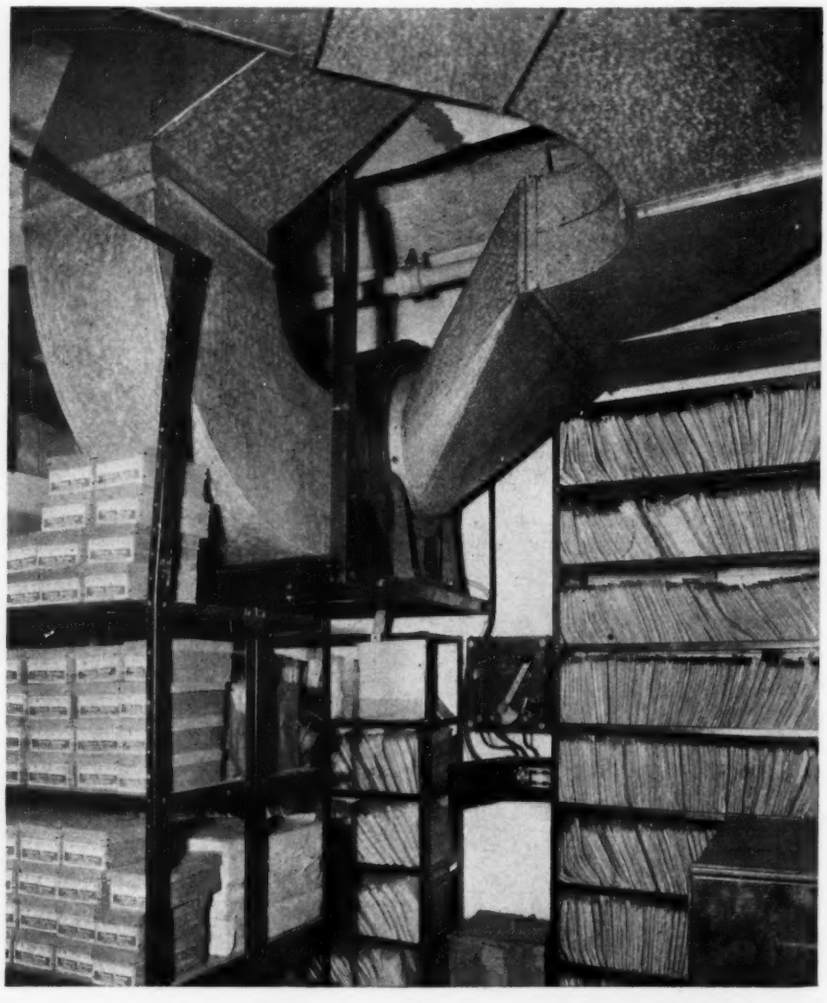
marily to use with the same company's gas valve and transformer. It may be adjusted anywhere between 40 and 90 degrees and it has been especially designed to counteract the ordinary tendency to overrun on room temperature. Thus, when the room temperature approaches a high set temperature, a special reaction becomes effective and the circuit opens and closes several times, thus checking the heating plant somewhat before the desired temperature is reached, thus acting as a kind of "snubber" against overrun. The same action in reverse checks the tendency for underrunning the temperature when the plant has been checked.

The room thermostat shown in Fig. 9, aside from its mechanical design, has been made with a view to fitting into the home decorative scheme. The electrical activating switch is hermetically sealed against dust, dirt and free fumes or gases. On both closing and opening there is a positive snap action. It operates on a temperature variation of one-half of one degree above or below the point set.

Commercial Mechanical Ventilation

There are many rooms in commercial houses that are below sidewalk level. There are others where materials or papers are stored, and

Fig. 10—Ventilation for below-street-level rooms — storage rooms—etc., is much needed



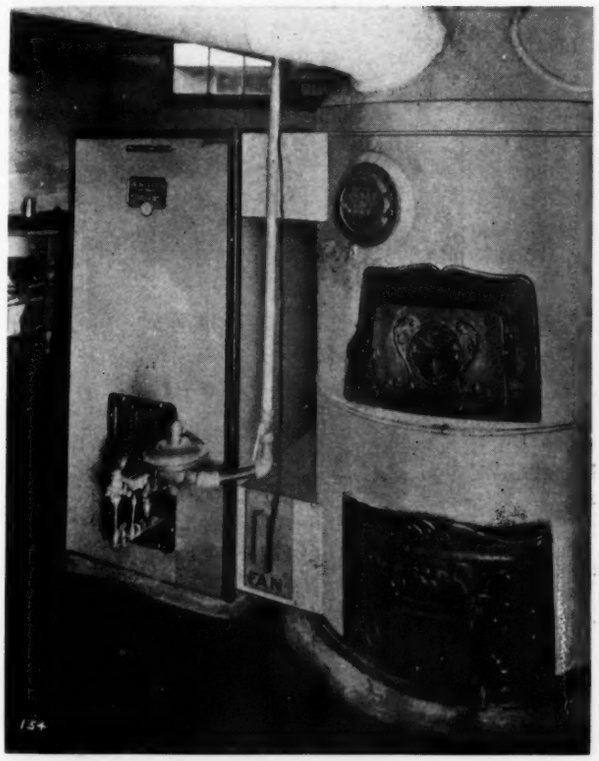


Fig. 11 — An auxiliary furnace offers great convenience for the "in - between" heating seasons

such material may give off a musty odor. In such rooms for comfort and efficiency there should be provided a means of positive mechanical ventilation. Fig. 10 shows a room below basement level where records are stored, and the system of mechanical ventilation which has been installed to keep the air from becoming stagnant and producing lethargy in those who may be required to work in the room.

Auxiliary Furnace

Spring and autumn bring a special heating problem. In the morning, before the sun's heat has made itself felt, and in the evening after the sun has set, there are periods of coolness when a little warmth in the house would be grateful. Not sufficient heat is required to make it worth while putting the main heating plant into operation, of course—yet the family would be definitely more comfortable for the addition of a little heat to the rooms. For this purpose the auxiliary furnace shown is admirable. It is installed alongside of the present warm air furnace, without change to furnace or piping system. Being gas operated, it is instantly available for part-time heating.

Coping Protection

In time, moisture gets between the sections of stone copings. The best way to protect the coping is to put on a metal coping, as shown in Fig. 12. This will keep water out of the joints and eliminate the danger of having a section topple out on the sidewalk. We have carried an article which also showed how stucco was peeled off by the action of water, where, again, the metal coping would have eliminated this condition.

Humidification

We are approaching the winter heating season. The subject of

Fig. 12 — Protection for copings keeps moisture out of the joints

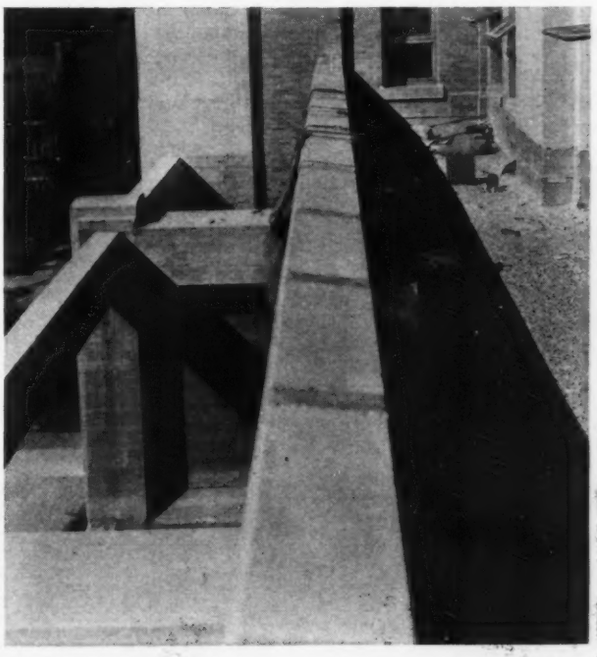
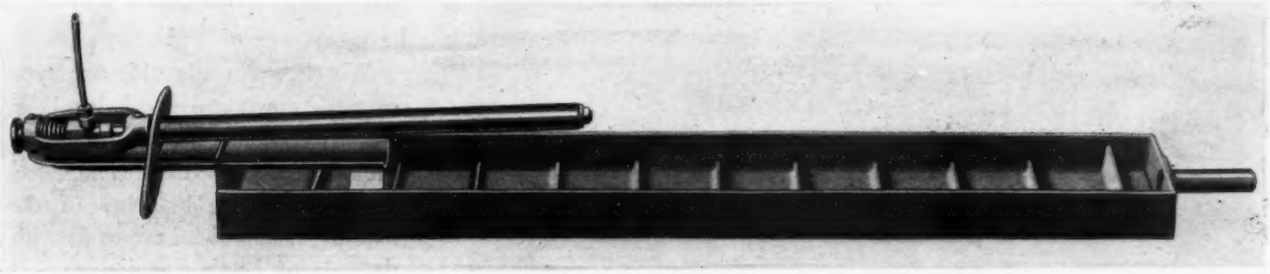


Fig. 13 — Automatic humidification will be of interest to the home owner as the heating season approaches



humidity and its control becomes an important one to the home owner. Correct humidity, and its control, is of importance during the winter months, as has been pointed out time and again. Elimination of dry air of high temperatures will be beneficial both to comfort and to health. The unit shown in Fig. 13 is automatic. It provides automatic humidification in exact relation to the heat that is being used.

Dust Collector Repairs

A great many industries must provide means for removing dust and shavings, for which purpose they have collecting systems. Such systems can last only a certain length of time and frequently small changes will be necessary—either changes or repairs. In Fig. 14 we show a case where a greater degree of efficiency was secured by shoving the supply line around in order to secure a better collection of the shavings in the building.

Here and there small plants are going into operation, or increasing their activities, and undoubtedly there is some volume of such work to be had at this time. Wherever there is a plant with such a dust collecting system it would be a good thing for the sheet metal man to contact the plant, inquire as to the condition of the system and any possible changes or repairs which may be necessary.

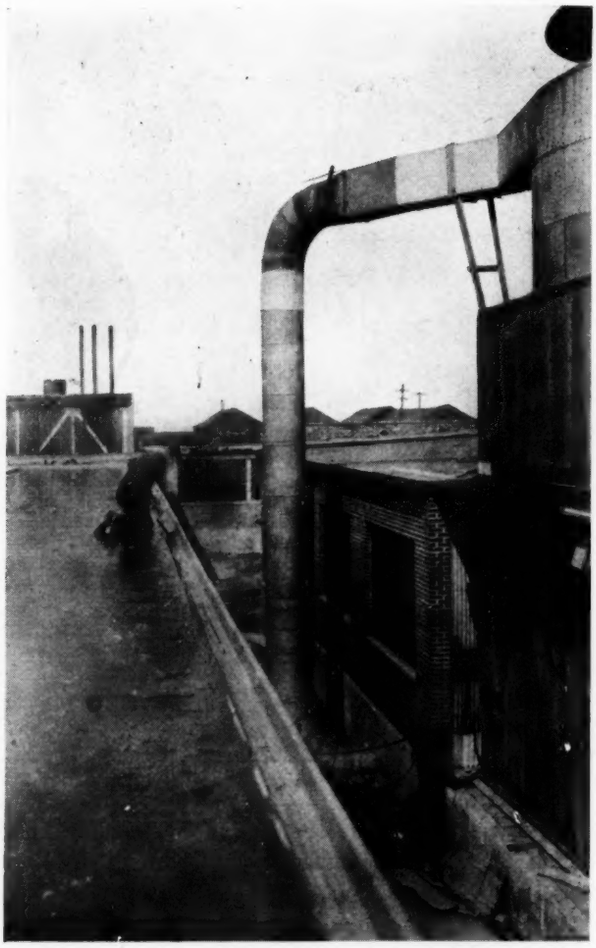


Fig. 14—As plants commence operation, dust-collecting systems will be in need of attention

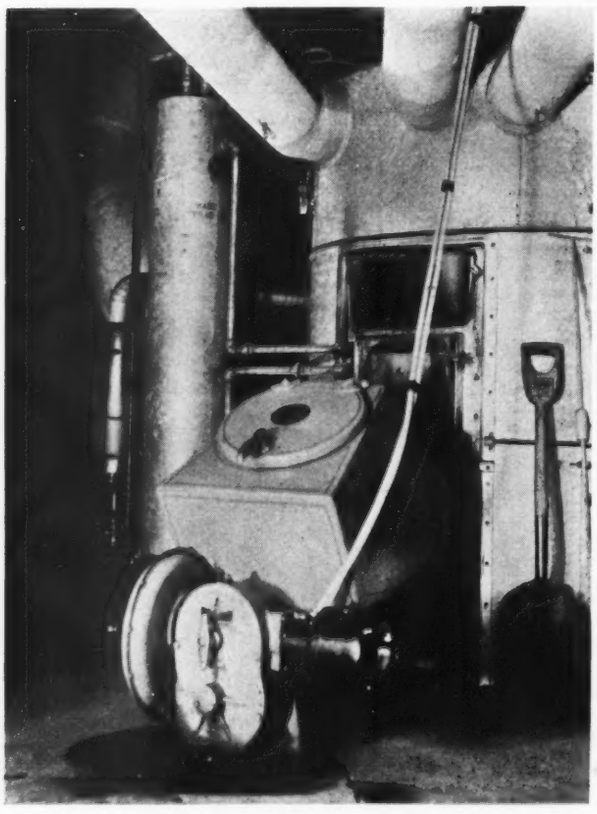


Fig. 15 — Automatic heating for the man who burns coal, with a stoker taking away the drudgery of handfiring

As industrial activity picks up, it will spread from one type of plant to another. Even though no immediate work may result from calling on local plants, this is a good time to get in touch with those who must keep the plant going. Then, when there is work to be done, the man who has been active will have at least an even break, and probably better, just because he has shown signs of activity and interest in the plant problems.

Stokers

We show, in Fig. 15, one type of well-known stoker. It has been steadily obvious to alert retailers in the last few years that a change has come over those branches of the building field which have to do with the sale of heating equipment. It

Fig. 16—Advertising specialties make work for the sheet metal man—and can be sold

would appear that many of the more successful firms have gone along with the change and have become interested in what is generally called specialty selling.

There may very well be, among the ten prospects you have listed, a home where there is a desire to keep on with coal heating, and the further desire to enjoy the advantages of automatic feeding and control.

Advertising Specialties

In the development of a successful sales plan, a little ingenuity is a very good thing. Every one familiar with the course of American business knows that many a product which has gone into general use and made money for its makers has been, at first, merely a chance discovery in the process of manufacturing some other product. Consequently, the sheet metal man should look a bit afield in considering the work that he may secure.

Fig. 16 speaks for itself. And in the touring age in which we live, thousands upon thousands of roadside stands have sprung up, selling everything from an ice cream cone to a new tire or rooms for the night. This immense coffee pot is constructed of sheet metal. It is, in effect, an advertising specialty.

It can be duplicated on a smaller or a larger scale for every type of roadside merchant, depending upon the products he offers. Metal advertising specialties have, of course, been widely used. The sheet metal contractor, knowing his community, will very likely be able to think of several business establishments where, with his skill in patterning sheet metal, his services can be made of value in calling the attention of those establishments to the public. It's worth a try.

New Air Conditioning Unit

Fig. 17 shows you another new air conditioning unit—and the number of new units of this kind which are appearing on the market would seem to indicate that manufacturers are confident that in the field of domestic air conditioning there is a market that holds great possibilities.

This is a smaller size unit, designed to bring the benefits of air conditioning to homes of the six-room type or larger. It is a complete unit, burning either coal or oil. It is designed to control temperature, humidity and circulation, as well as filtering of the air.

The entire unit is encased in an enameled casing—a matter of some importance these days when the idea of the basement recreation room has taken such a hold on home owners.

▲ ▲ ▲ ▲

Key to Manufacturers

Fig. 1. Milcor Steel Co., Milwaukee, Wis.
Fig. 2. Kleenaire Filter Co., Stevens Point, Wis.
Fig. 3. Aluminum Co. of America, Pittsburgh, Pa.
Fig. 4. American Blower Co., Detroit, Mich.
Fig. 6. Premier Furnace Co., Dowagiac, Mich.
Fig. 8. H. M. Sheer Co., Quincy, Ill.
Fig. 9. Mercoid Corp., Chicago, Ill.
Fig. 11. Forest City Foundries Co., Cleveland, O.
Fig. 13. Automatic Humidifier Sales Co., Detroit, Mich.
Fig. 15. Iron Fireman Stoker Co., Portland, Ore.
Fig. 17. Fox Furnace Co., Elyria, O.

▼ ▼ ▼ ▼

Fig. 17—Another new air conditioning unit for homes of the smaller type

Comfort Cooling For Homes

By H. J. Macintire

A Series of articles discussing the basic principles of cooling and the application of present equipment and methods now in use

Cooling With Water and By Drying

AIR at any temperature has a definite amount of water vapor (steam) that it can absorb. If it has absorbed all that it can at any temperature it is said to be saturated with water vapor. If it has absorbed only one-half of the maximum weight it is said to have 50% relative humidity. The more general method is to take *as a unit* one pound of any air and consider the amount of moisture it contains as the weight that varies.

Evaporation Lowers Temperature

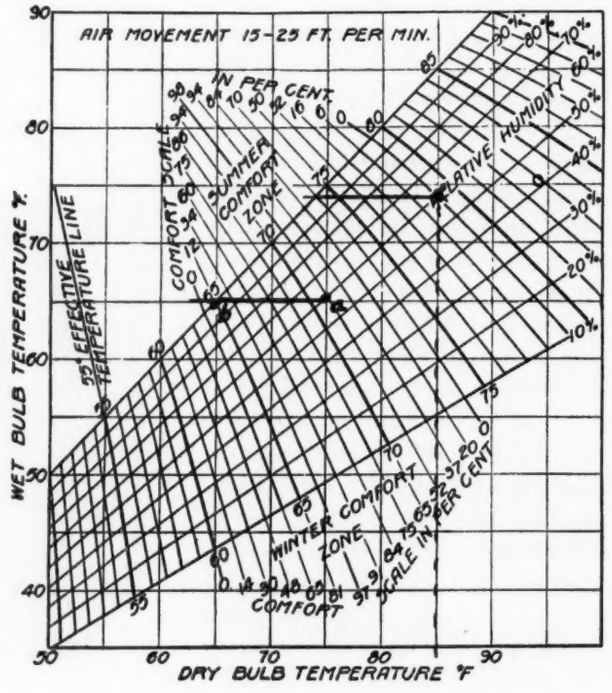
If air that is not saturated with moisture is brought into contact with water there is a tendency for the air to absorb more moisture and to become saturated with water vapor. The air, however, cannot absorb water but has to evaporate the water and then absorb the vapor. Such physical procedure is common in nature, as is evident by the evaporation of water in ponds and lakes.

The evaporation results in a lowering of the air temperature.

The depression of air temperature can be tested by wrapping a little wet gauze around the ordinary thermometer and then rotating the thermometer at arm's length so as to make it come into contact with air at a velocity of about 15 feet per second. The result will be that some moisture will be evaporated from the gauze at a *depressed* temperature which is a definite temperature as is shown on the psychometric chart, and is called the *wet bulb* temperature.

This physical action is made use of in a number of ways. Spray pads and cooling towers cool water for steam turbine and internal combustion power plants and for refrigeration plants. The same action is used in some air conditioning plants. For example, if spray nozzles are arranged in a chamber through which air is made to pass and if the chamber is large enough and velocity is low enough some moisture will be evaporated and the air will leave the spray chamber saturated with water vapor and at the *wet bulb temperature*. The moisture contained in the air is increased by the amount evaporated in the spray chamber. However, as it takes heat to evaporate water, it is quite evident that in this case the heat has to come from the air itself, or that the air is cooled by an amount equal to the *product* of the pounds of water evaporated in the spray chamber and the so-called latent heat of evaporation of the water.

As the latent heat of evaporation of water is about 1050 B.t.u. per lb. of water evaporated, the result is that a large amount of cooling is possible with the use of the spray chamber, especially if the air is 50% relative humidity or less. The relative humidity of the air passed through the spray chamber is the deciding factor. If the air is initially very humid it cannot absorb moisture from the sprays and therefore cannot be cooled. If the air is very dry it can absorb a large amount of water vapor and the air



On this chart two sets of temperatures and humidities are plotted to show how eventual air temperatures are arrived at. Note that 85 degree air with 60 per cent relative humidity gives 74 degrees wet bulb or a drop of 11 degrees. As humidity rises for constant dry bulb eventual effect is lost because of too much humidity for comfort

will be cooled considerably in the process.

The initial relative humidity is the factor to be considered.

Referring to the chart it will be seen that air at 85 deg. F. and 60% relative humidity has a wet bulb temperature of 74 degrees which represents a cooling of 11 deg. F., according to the dry bulb thermometer. Undoubtedly there would be some advantage in such a process, even though the temperature rise, during the absorption of heat by the air circulated by the fan from the spray chamber to the rooms of the house, is as much as 5 degrees.

However, it is very evident that if the outside air remained at 85 deg. F., but the amount of moisture increased, as it would on a sultry day, to 80% or more the advantage of using a spray chamber would vanish at the very time that comfort cooling is most required.

In such climates as are found in western and southern Colorado, New Mexico, Arizona, Utah, southern Idaho, etc., such a method of comfort cooling would be highly effective and satisfactory, because the air is very dry, but it would be a miserable failure at times in every locality where relative humidity of 60% and especially 80% are to be found during the four summer months.

Water Must Be Cold

The result is that where water is used for comfort cooling without resort to any refrigerating machine or drying device the water must be initially cool, otherwise there will be no control at all on the results of the spray chamber. In the case of silica gel and other drying or dehumidifying substances it is possible to reduce the humidity to a very small amount so that subsequent evaporation of water at a relatively low wet bulb temperature will provide the desired cooling and still give only a reasonable relative humidity.

Let us take the calculated load of our typical detached residence as 7650 B.t.u. per hour and see what results are possible with 55 deg. F. water.

If water is used for cooling and then wasted it may be possible to restrict the temperature rise in washer and water line to a few degrees. In all likelihood, however, a 10 degree rise at least would be expected. This means that with a 100% efficient spray, the air could be cooled to 65 deg. F. (and probably 100% relative humidity). The amount of water used will be

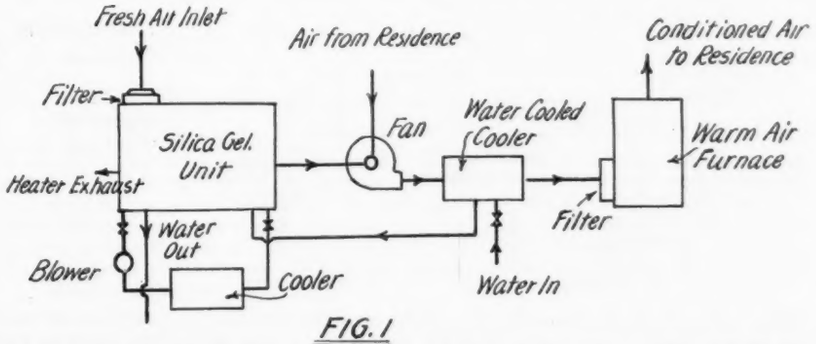


FIG. 1

This schematic diagram shows the apparatus and cycle used for cooling by drying. Water must be cold. Only a part of the air is de-humidified, otherwise relative humidity would be too low for comfort

$7650 \div 10 = 765$ lb. or 91.8 gal. per hour.

The air circulated through the house after leaving the spray chamber at 65 degrees on passing through the ducts will absorb heat. The amount of air circulated should be sufficient to give the ventilation desired. If the amount so circulated results in a rise of 10 degrees then the air temperature maintained in the house will be 75 deg. F. and the relative humidity will be usually about 70%. This condition appears to be satisfactory, according to the comfort chart given in the figure.

Temperature Governs Cost

Of course, a higher temperature water could be used, say, 60 deg. F., and the same result could be obtained by spraying twice the amount of water with only 5 degrees rise of temperature. This will mean twice the cost of the water, more power for the pumping of the water and more nozzles, larger spray chamber, etc. There will be periods in the summer, and particularly in the southern states, where a warmer house temperature will be acceptable and where a warmer water than 55 degrees would be practical to use.

However, 55 deg. F. can be taken as the maximum water temperature for general use.

Conclusion. Cooling of residences by the use of tap water is practical and perfectly satisfactory. However, the temperature of the water must be 55 deg. F. or less for general use where satisfactory results are expected.

Silica Gel

We referred in the forepart of this article to the possibilities of drying in order to use water for cooling. Let us consider, here, some of the aspects of air drying in relation to cooling.

The use of gas heat does not mean that the old absorption refrigerating machine using aqua ammonia must be employed for the cooling of the air, but rather a relatively new substance called silica gel (SiO_2) which looks like clear quartz, having a strong capillary attraction will be used to *adsorb* the moisture in the air.

The machine works on the drying principle since the silica gel, which is in this case capable of passing a 8 mesh, is filled with minute cells. These cells, or pores, adsorb the moisture in the air (or other vapors like ammonia, sulphur dioxide, etc.) in an amount varying from 25 to 35% by weight of the weight of the

silica gel without apparent increase in the volume of the gel.

After saturation the gel has to be reactivated which may be done by heating to about 210 deg. F. by the combustion of gas and permitting the hot products of combustion to pass through the bed of silica gel and out into the atmosphere carrying with them the moisture in the gel. In about 30 or 35 minutes the gel is freed of moisture, but it is still at about 210 deg. F. After cooling to about 70 degrees it may adsorb another 25 to 35% by weight of moisture. With two such beds of silica gel, alternating with each other, the process of dehumidifying may be made continuous without appreciable injury to the silica gel. Therefore, a cycle of operation consists of adsorption of moisture, heating and reactivation, whereby the water is driven out of the pores by evaporation, and finally, cooling of the gel.

In the last process, a closed circuit, including a water cooled air cooler the silica gel unit and an air blower circulating the *same air* through the cooler and the unit containing the silica gel. The water which absorbs the heat in the bed of silica gel is usually wasted.

The Absorption Cycle

Fig. 1 shows a schematic arrangement of the apparatus required to dehumidify and to cool with water where the cooling water is sufficiently cold. In no comfort cooling installation is there any thought of cooling by means of a refrigeration unit when silica gel is used, but rather the idea is to use water for this purpose *after* dehumidification.

In Fig. 1 it will be seen that in addition to the dehumidification unit there is the so-called water-cooled cooler using the coldest water available at the residence. The cooler consists of a series of sections, each section being constructed by the use of copper tubes with copper radiating fins soldered to them.

On account of the efficient drying ability of silica gel it is not practical to permit the entire fan capacity to circulate through the dehydrating unit. Such a process would give the house the drying atmosphere of a Sahara desert and would be worse than some winter heating installations not using humidifiers.

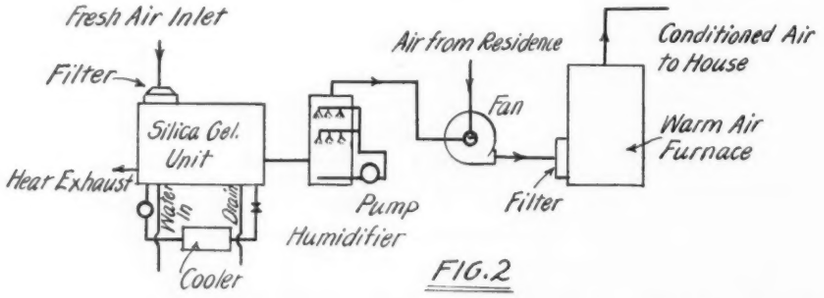


FIG. 2

When water is warm, evaporative cooling must be resorted to. This shows such an arrangement with a spray tank for cooling air. The air is first dried so that even with warm water relative humidity pickup in the sprays will still give cooled and de-humidified air in the house

The result is that only 10 or possibly 25% of the entire fan capacity is permitted to pass through the gel. It will be noted that the air entering the dehydrator unit is marked "fresh air." It is questionable that the ordinary isolated residence will require any very large amount of fresh air except when a large number of guests are present. It is understood that the house is supposed to be closed, but infiltration nevertheless is a considerable factor and the amount of air entering in this manner is increased by the opening of doors from time to time. The air passing through the gel will then be some small amount of fresh air and some air from the house. The dehydrated air (heated to about 180 deg. F.) will either mix with the air at interior house temperature, and be cooled by the water cooled coils in the cooler, or it will be cooled first by the tap water to some nominal temperature and then mixed with the recirculated air from the house.

Cooling Done by Water

In the arrangement just outlined the main diffculty is one of the cooling water, inasmuch as all of the actual cooling is done by means of water. In some localities water is cold and cheap, as for example, Chicago water is seldom hotter than 70 deg. F. and the cost is stated to be 60 cents per 1000 cu. ft.

In other cities and towns water is much hotter and costs three or more times as much. The use of a cooling tower does not seem practical for comfort cooling even if a desirable cooling tower could be designed for residences. With a tower the best that could be done would be to cool the water to about 2 degrees of the wet bulb temperature. However, an interior cooling tower could be made effective for that part of the process where the silica gel has to be cooled after activation, as well as preliminary cooling of the air after dehumidification.

Cooling With Warm Water

Where water is initially warm, for well water is approximately at the year-round average temperature, whereas surface water is at approximately the monthly temperature preceding the month that it is used, it is necessary to make some changes in the arrangement as is shown in Fig. 2. This includes the removal of the cooler and the addition of a spray chamber which acts as an evaporative cooler, thereby cooling the water and the air.

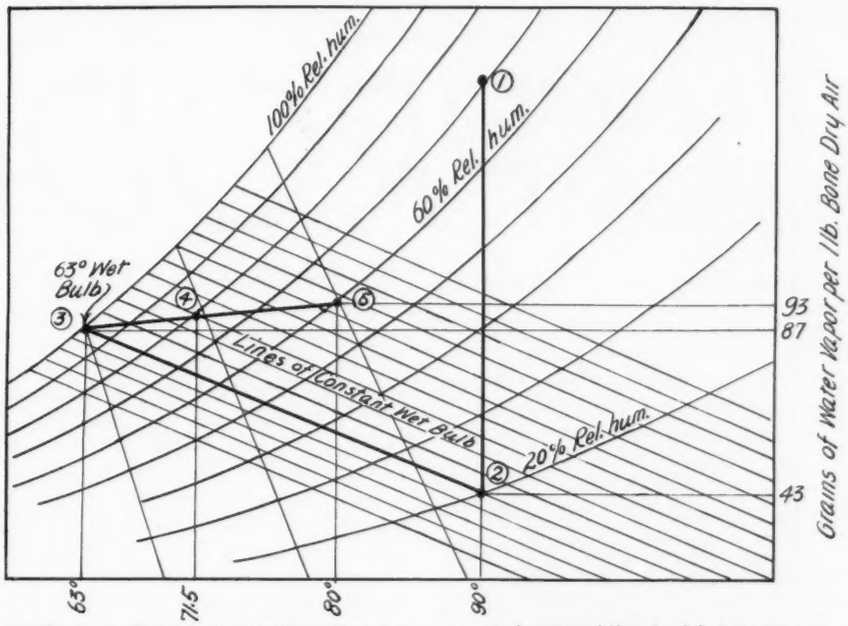
It is actually a humidifier, but as the air entering the spray chamber may have a humidity of as low as ½% (but probably is not for the entire time of adsorption) the temperature of the wet bulb may be as low as 63 deg. F. if the dry bulb temperature is 90 deg. F. and the relative humidity 20%. This corresponds to about 43 grains of moisture per 1 lb. of bone dry air. At the wet bulb temperature of 63

deg. F. the moisture content will be about 87 grains, resulting in an increase of moisture content of 44 grains per pound of air during the drop of temperature of 27 degrees.

If this air is mixed with an equal weight of air from the house at 80 degrees and 60% relative humidity (with 93 grains of moisture per pound of air) the resulting temperature will be 71.5 deg. F. and the relative humidity will be about 79%.

The assumption would be that enough air would be circulated so that the sensible heat entering the house by the various methods would raise the temperature from 71.5 to 80 degrees and the humidity would change at the same time so as to give the 60% assumed in the problem. The amount of air by-passed through the silica gel unit and the humidifier would very naturally have to vary with the cooling load in the house.

Fig. 3 gives a very good idea of the process of dehumidification, reevaporation and cooling and finally the condition after mixing with an equal weight of air from the house. The figure is the usual humidity chart which is given for air conditioning.



If air at 90 degrees dry bulb and 70 per cent relative humidity is dried to 20 per cent relative humidity as shown by the line from 1 to 2 the air will have 43 grains of moisture per pound. If this air is then passed through a washer and saturated to 63 degrees wet bulb the air will have 87 grains of moisture per pound line 2-3. In drying-cooling this air is usually mixed with an equal amount of house air—say 80 degrees dry bulb and 60 per cent relative humidity, point 5. The resulting mixture is air at 71.5 degrees and 79 per cent relative humidity, point 4

Conclusion

The silica gel gas-fired dehumidifier unit is a practical means of control of the conditions in a residence for purposes of comfort cooling. It is a bulky apparatus at present and it may require an excessive cost for the water, as cooling is accomplished by the use of water only. However, any refrigerating machine will use water unless, like the fractional tonnage unit, they are designed for the use of the air-cooled condenser.

The use of tap water for cooling appears to be prohibitive for general use on account of the cost, and the answer appears at present to be the spray chamber humidifier-cooler, using about 25% more gas for the activation process, however, and a special form of cooling tower for that part of the cooling where the air is circulated through the gel after activation, and in the preliminary cooling of the dehumidified air.

The first cost of the system is high, but this may be decreased considerably when production has been developed. The system is adapted nicely to the use of the existing stacks in the warm air furnace heating installations. It gives a satisfactory answer to the problem of comfort cooling for the entire house and it should be very nearly noiseless. Naturally one would not install such a system for one residence room only, nor place the silica gel unit in a locality where gas is not available for use.

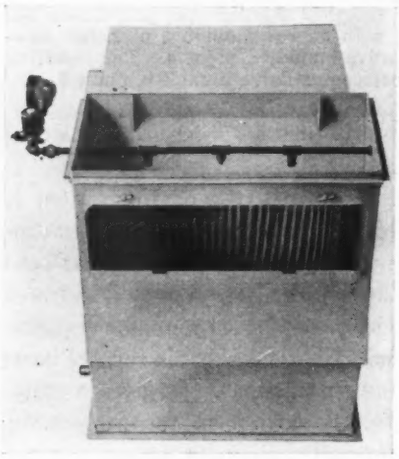
We will conclude Professor Macintire's series on cooling in the next issue when he discusses cooling by refrigeration. Many comments have been received on the articles. Knowing, as we do, that cooling is a subject about which most of us know little or nothing, we want to publish a new series early enough next year so that contractors will have the data available for the 1933 cooling season. In order to make this new series as valuable as possible we will welcome reader's suggestions. What information do you need most?

New PRODUCTS

Fairweather Air Conditioner

The Lakeside Company, Hermansville, Michigan, makers of Furblo, have just completed, and are beginning to market, what is known as the Furblo Fairweather Air Conditioner. Research, experimentation and exhaustive tests have been going forward for quite a number of months.

The Fairweather is built on an entirely new principle to overcome increased air resistance in a filter as it gradually becomes more and more clogged with dirt and dust. Instead



of being placed above the air washer, the filter is placed in such a way as to filter the air after it has been washed, and is placed in a vertical position where it receives the full force of the water spray which keeps it constantly clean.

The filter, specially designed for this purpose is of vertical V-type, giving a greatly enlarged cleaning surface, and it is filled with spun glass wool fibre. This filter is patented and made exclusively for the Fairweather Conditioner. In its vertical position, it serves both as a water eliminator and as a filter.

Being filled with glass wool fibre, the filter will not wear down, rust, nor deteriorate from the water flow, and, being constantly sprayed with water, the air is not only washed, but also scrubbed as it passes through the wet glass fibres. Being constantly sprayed, there is no possibility of an accumulation of dirt increasing the resistance against the free passage of the air. The combined resistance of the water and filters is very low, being less than ⅛-inch.

The Furblo Fairweather comes complete with a full complement of controls, such as humidistat, room thermostat, damper motor, electric transformer, limit control, solenoid valve, and even such other necessities as hook-up wire, damper control wire, chain and pulleys. The Furblo used in the Fairweather Conditioner has a new variable speed drive ranging from 300 to 600 R. P. M. at approximately 25 R. P. M. steps. It is equipped with new self-aligning bearing housings.

The unit will be produced in five sizes, comparable with the present sizes of Furblo.

Mr. I. W. Rowell, manager of the Lakeside Company, says: "I knew some day some one would perfect a complete, compact automatic air conditioning unit that would be as efficient as today's electric refrigerator, in which would be incorporated an air washer and a combination self-cleaning air filter, air scrubber, and water eliminator, that would assure a steady and unchanging volume of circulated air."

◆

Versatile Unit Ventilator

A new small unit ventilator, which may be used for kitchen exhaust, office, store, garage and small industrial applications, is announced by Forct-Air Company, Rockford, Ill.

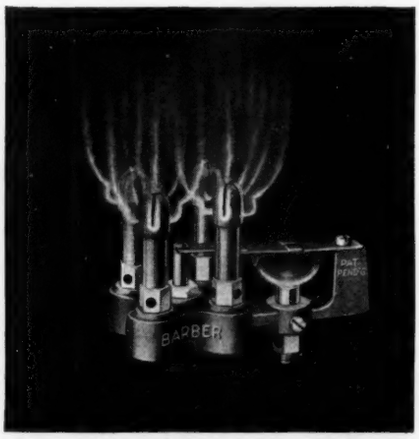
The unit consists of a motor driven propellor fan housed in a rectangular box, the complete assembly weighing 13 pounds. The unit comes equipped with electric cord and switch and sells for $24.00.

The unit has round pipe collars or rectangular collars as wanted. It can be placed in the kitchen wall. For office and shop ventilation it can be placed at the top of a duct section to draw air off the floor and force it across the room or out of doors. In industrial exhaust the fan unit is connected into the duct or blow pipe run.

Literature has been prepared and can be secured from the company.

New Barber Conversion Burners

The Barber Gas Burner Company, 3702 Superior Avenue, Cleveland, Ohio,



has developed a new line of conversion burners with slotted cap and bell baffle burners and a safety pilot control. These units were developed to meet the demand for efficient and small burners for domestic and industrial installations.

The features claimed for these units are—noiseless, will not back-fire, do not deposit carbon, no air mixer adjustment, develops 1900 degree flame temperature, usable with snap action or throttling thermostats.

Complete information on this new line is contained in a leaflet which can be secured from the company.

◆

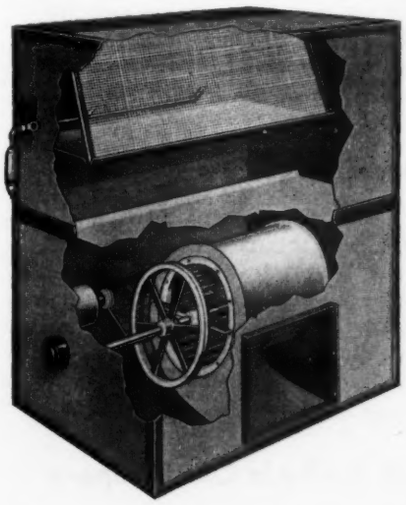
Buckwheat Blower for Domestic Heaters

International Heater Co., Utica, N. Y., announces the Buck-Burn Blower, a small fan to be attached to the ashpit door of a heater to increase the draft. Use of the blower makes possible the burning of finer sizes of anthracite and also is convenient as a booster to the natural draft in igniting a fresh charge of fuel or in starting a fire. When used in conjunction with a room thermostat and a safety limit switch, the blower will serve to regulate the fire to conform to the heat required, and reduce attention to the furnace materially.

New Washer and Blower Announced

The accompanying illustrations show the new Rudy air washer and filter and combination unit.

On the unit, air enters the top, passes into the spray chamber and through the filter. The filter is made of spun glass held in place by a fine mesh screen. The spray from the nozzles plays against a filter saturating it with water through which the air must pass to give a cleaning surface well suited to small air washing equipment.



After the air has passed through the filter it enters the fan inlet and is forced through the duct system.

The solenoid water valve should be controlled by a humidostat so that the spray will operate only when humidity is called for which will be about 15 or 20 minutes out of the hour. Figuring an air change of from three to four times an hour gives at least one good washing of the air every hour. When the spray is not operating the air is still being cleaned by passing through the dry filter.

For the average residence the equipment illustrated would deliver approximately five to six hundred cubic feet of air per minute. The larger sizes will have greater filter area and larger fan and more motor capacity to take care of greater volume of air.

The number ⅞ washer and blower is designed for furnaces up to 60,000 B.t.u. output. The Rudy engineers state that a blower cannot properly be assigned to definite sized furnaces, but should be governed by the conditions of the piping as well as heat losses. The problem is to maintain air velocities against the frictional resistance that is offered by the installations in addition to furnishing the proper volume of warm air. The equipment used in this No. ⅞ is comprised of 1/6 H. P., G. E. motor, Dodge Transmission, SKF bearings, a squirrel cage type or centrifugal wheel. The motor is spring mounted set on rubber, shudder-proof insulators, as are the bearings.

This unit complete with everything but furnacestat and humitrol is $145.00 to the dealer. The blower alone sells for $85.00. Terms F. O. B. Dowagiac, 2% 30 days, net 60 days.

The next larger size blower Number 1 delivers 880-1000 cubic feet per minute. It will take care of furnaces up to 150,000 B.t.u. output. The equipment is the same as No. ⅞ excepting larger filters and larger blower. The ⅞ wheel is 11 inches in diam. No. 1 is 13 inches

Price: Blower and washer complete less furnacestat and humitrol $155.00. Blower only $95.00 F. O. B. Dowagiac, 2% 30 days net 60 days.

A New Bolt Anchor

The Rawlplug Company, Inc., New York, announce a new screw anchor, the Rawl-Anchor, a one-piece, heavy-duty, double expanding masonry anchor for bolts.

They depart from usual construction in that a double inverted cone body of aluminum is employed as the expanding factor, which, it is said, gives it greater holding power.

Among its many features are: one-piece construction—no top or bottom—either end may be inserted in the hole; when properly caulked at a sufficient depth a single Rawl-Anchor will develop the entire strength of the bolt or surrounding material; as only one unit is used for any size bolt, there is but one caulking operation needed; the ductile aluminum collars top and bottom spread upon being

caulked and completely seal the hole, preventing the lead from "flowing" under a load pull; the bolt will not turn in the hole as the bolt head imbeds itself in the ductile aluminum collar when caulked.

Anyone desiring detailed information on this new product may procure it by writing The Rawlplug Company, Inc., 98 Lafayette St., New York City.

New Blower Line Announced

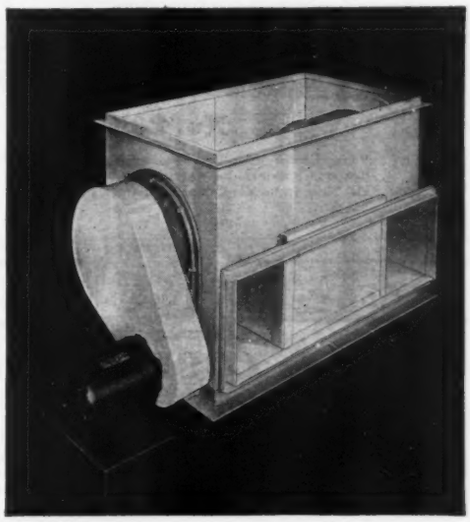
A new line of furnace blowers, designed for semi-gravity operation when the blower is idle and affording a wide range of capacities is announced by the Premier Warm Air Heater Company, Dowagiac, Mich.

These blowers will be known as the "Double-Duty" line and are being introduced as a companion line to the newly announced unit air conditioners.

Ten sizes will be offered, with the smallest delivering 841 C. F. M. and the largest 8,510 C. F. M. A feature is a partition plate which can be left in place for complete mechanical operation or removed to allow for semi-gravity operation.

Another feature is the wheel support which is bolted directly to the floor without direct connection with the housing. This is stated to reduce vibration and noise to a minimum. The pulley guard fastens to the housing through a canvas collar. The housing has been designed for compactness and neat appearance.

Information and prices can be obtained from the Premier company.



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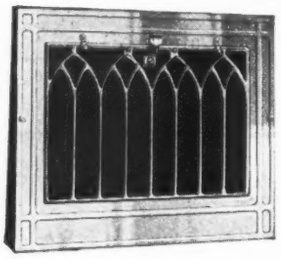
Quality counts these days as never before. That's why it's so decidedly the part of wisdom to standardize on a line which assures you the finest register for every purpose. Compare the H & C line with any other. You'll find it offers wider selection, better designs, and each register incorporates finer workmanship, greater air capacity, and superior mechanical features. Standardize on H & C. It pays.

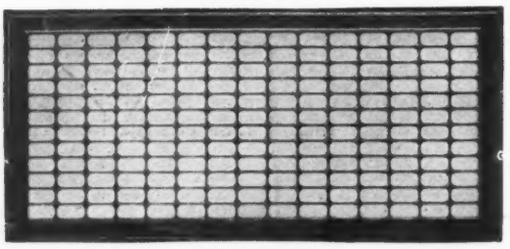
Leading Jobbers Carry Complete Stocks



No. 110

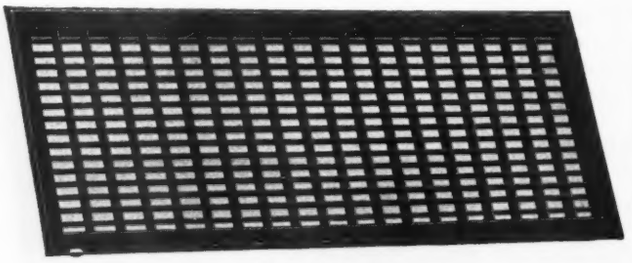
By considerable odds the most popular baseboard register made. You're not limited to this style alone, however, when you standardize on H & C. There are two other attractive designs from which to choose, with full lines of sidewall registers and cold air returns to match.

Two Types of Steel Cold Air Faces Assure Pleased Customers and Most Advantageous Installations.



No. 255

Certainly the finest pressed steel cold air face by any comparison. Our famous pinched-back fretwork affords free air capacity averaging 10% greater than other faces of this type. Check this statement and see for yourself.



No. 265

"NO-FLEX" — An improved grid construction Cold Air Face. Particularly suitable for installation with single flooring. Available in all sizes in medium and medium dark oak and all other standard finishes.

WROUGHT STEEL H&C WARM AIR REGISTERS

HART & COOLEY MFG. CO.

General Sales Offices, 61 W. Kinzie St., Chicago

New Britain, Conn., Corbin Ave. Philadelphia, Architects Bldg.
Boston, 75 Portland Street New York, 101 Park Ave.

Registers for all purposes. Also a complete line of perforated and cast ornamental grilles, furnace regulators, dampers, damper regulators, pulleys, chain, and the H & C Automatic Heat Control.

News Items . . . . . .

Reader Wants Literature

F. W. Thorp, instructor in sheet metal work and heating at the Vocational School, Green Bay, Wisconsin, would like to secure catalogues, literature and any instructive material which can be used in class work. He is especially anxious to get catalogues on heating, ventilating and air conditioning which contain estimating and engineering data.

Mr. Thorp would also like to establish contact with manufacturers who have moving pictures showing installation and manufacturing processes. These pictures are to be shown before classes and to gatherings of tradesmen and townspeople.

Firms having such material will please write to Mr. Thorp stating just what material they have.

◆

Move Chicago Office

The Williamson Heater Company has moved the Mid-Western Branch Office from 1211-13 Madison Street, Maywood, Illinois, to 525-27 W. 103rd Street, Chicago, Illinois.

A complete stock of Williamson Furnaces and air conditioning equipment together with repairs for Williamson products will be carried in stock for prompt service to the trade at all times.

◆

Forty Years of Service in One Company

On July 30, E. H. Hoffeld, President and General Manager of the Ferdinand Dieckmann Company, Cincinnati, celebrated forty years of service with his company. Mr. Hoffeld started with the company as a boy thirteen years old and has progressed through the ranks to his position as guiding executive.

During Mr. Hoffeld's long period of service he has watched business boom and die away and hundreds of thousands of Dieckmann items pass into the hands of furnace and sheet metal contractors.

AMERICAN ARTISAN extends its best wishes for many more years of active participation in the affairs of these businesses.

◆

Some Interesting Figures

C. M. Ripley, of the General Electric Co., discussing the market for electrical appliances, recently told the convention of the National Electric Light Association that of the 30,000,000 dwellings in the United States, 29,000,000 have no electric range; 27,000,000 have no electric refrigeration; 24,000,000 haven't an electric fan or percolator; 22,000,000 have no washing machine; 20,000,000 have no electric radio; 21,000,000 no electric vacuum cleaner and 11,000,000 no electric iron."

"Telephones number 20,000,000, but it took 23 years to get the first million in the United States. In 1895 there were 4 automobiles, and now we have 26,000,000, but it took 18 years to get the first million. It took 25 years to get the first million trucks."

While no mention was made of oil burners or stokers, information indicates that the oil burner is just now approaching its first million installations. The stoker industry estimates some 80,000 installations.

News Items . . . . . .

Unfair Trade Practice

Orders have been issued by the Department of Commerce to cease and desist as unfair practice false and misleading advertising being done by the Metal Tile Construction Company, Inc., New York City. The company has been advertising a metal product simulating tile as "Belgian Tile."

◆

Old Company Changes Ownership

Announcement is made that the Otto Bernz Company, Inc., has been purchased by Rochester, N. Y. interests and will be operated from Rochester.

Otto Bernz, founder of the company, died some five months ago. The new owners decided that the former quarters in Newark, N. J., were not suitable for modern manufacturing methods and that better facilities and working conditions could be maintained in Rochester. Accordingly a large stock of products were first moved. Then the equipment and remainder of the stock were trucked to the new factory.

The new owners announce that modern machinery will be purchased as required for betterment and enlargement. No changes in personnel except in the financial setup will be made.

The new address is 280 Lyell Avenue, Rochester, N. Y.

◆

Shop Moves to New Quarters

Philros Sheet Metal Works, Inc., Bronx, New York, recently organized, has leased space in factory at Lincoln Avenue and 133rd Street, and will occupy for new plant.

◆

Appoint Cincinnati Distributor

In keeping with a recently announced policy of sales expansion in the interests of better service, the Rawlplug Company, Inc., of New York City announces the appointment of The C. K. Cairns Co., 119 East 5th St., Cincinnati, Ohio, as its representative in that district.

Appointment of the C. K. Cairns Organization, which will carry a complete stock of Rawl products, including Rawlplug Fibre Screw Anchors, the new double-ended one-piece Rawl-Anchor for bolts; 3-point, resharpenable Rawldrills for masonry; and Crowners and Lok-Crowners for sealing and concealing bolt heads, nuts and screw heads, was made in order to give better service to the company's many customers in southern Indiana, central and northern Kentucky, western West Virginia, and central and southwestern Ohio, which will henceforth be served from the Queen City headquarters.

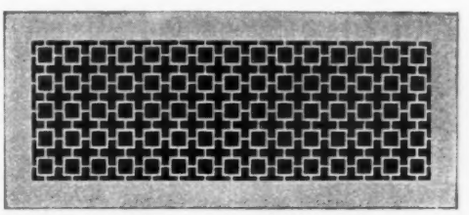
◆

Signs of Business Pickup

The Homer Furnace Mfg. Co., Coldwater, Mich., manufacturer of heating furnaces, castings, etc., is running on full time, six-day week basis with regular working quota, and is operating a night shift for three nights each week.

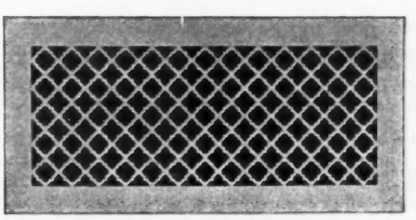
Now--A 3-Way Choice of Air Conditioning Register Faces

Our entire line of air conditioning registers including one and three piece baseboard registers, sidewall registers and return air intakes, is now available in the two very attractive designs shown below as well as in the plain lattice design. The greater range thus provided should go far to thoroughly satisfy the tastes of all prospects.



No. 40 Grille

A very attractive face now available on all our air conditioning registers and return air intakes.

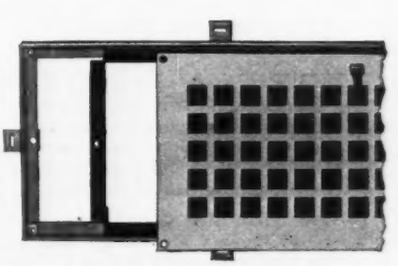


No. 30 Grille

Another graceful design which will appeal to many. Also available on all H & C air conditioning registers and return air intakes.

3 Piece Construction

This cut illustrates our lattice face and 3-piece construction used on both baseboard and sidewall registers, assuring unusually secure, convenient, and attractive installations. The sidewall register is designed to set flush with the plaster.



No. 3351 Sidewall Register

For old house work or where flush installations and a removable face is not essential, our one-piece registers, available in both sidewall and baseboard types, are very suitable.

WROUGHT STEEL H&C WARM AIR REGISTERS

HART & COOLEY MFG. CO.

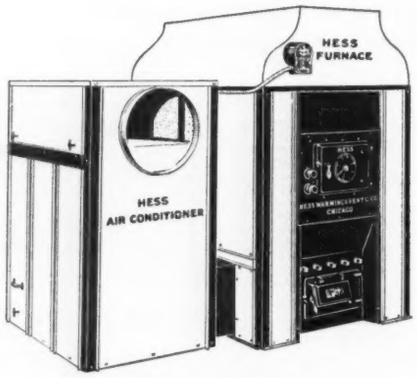
General Sales Offices, 61 W. Kinzie St., Chicago

New Britain, Conn., Corbin Ave.
Boston, 75 Portland Street
Philadelphia, Architects Bldg.
New York, 101 Park Ave.

Registers for all purposes. Also a complete line of perforated and cast ornamental grilles, furnace regulators, dampers, damper regulators, pulleys, chain, and the H & C Automatic Heat Control.

A Dependable Air Conditioner for the Average Home

— at a price within the reach of all . . .



The Ideal Combination

Hess Welded Steel Furnace with Hess Air Conditioner

The most successful dealers selling air conditioning today are those installing equipment in the average home. There are hundreds of prospects in every community who can be sold air conditioning, if approached with the right equipment at a price they can afford to pay.

As shown in the accompanying illustration, the Hess Dealer can offer a complete unit—welded steel furnace and air conditioner—or either one separately in the case of remodel jobs.

LEAKPROOF FURNACE—FOOLPROOF CONDITIONER

The Hess Welded Steel Furnace is square in construction throughout. The inner body or radiator as well as the outer casing are square, giving greater heating power, and every seam is electrically welded to insure everlasting tightness.

The Hess Air Conditioner is a self-contained air filter, blower, air washer and humidifier, and may be used with other makes of furnaces and even with hot water or steam heating systems to provide the benefits of conditioned air and year 'round comfort. No electric valves or spray nozzles that give trouble and waste much water are used in the Hess Air Conditioner. Only water actually necessary for proper humidification is consumed.

Many years in the manufacture of air conditioning and warm air heating equipment carry Hess products far beyond the experimental stage and make possible prices within the reach of the average home owner, with a nice profit for the dealer, too.

Let us tell you more about our proposition. Write today.

Hess Warming & Ventilating Company

1201-11 S. Western Ave., Chicago, Ill.

News Items . . . . . .

Stephen Price Moncrief Dies

Stephen Price Moncrief, founder of the Moncrief Furnace Company, Atlanta, Georgia, died in Atlanta August 25, 1932.

The company states that Laurence F. Kent, who was elected president and general manager upon Mr. Moncrief's retirement in 1926 will continue in that capacity with the same heads of departments and officials.

◆

Mrs. Howard Perkinson Dies

A short time ago Mrs. Howard Perkinson, wife of Howard Perkinson, Chicago manager for the Thatcher Company, met with a serious accident. As a result of injuries sustained in the accident she passed away June 30.

◆

Stoker Sales Improve

Stoker sales of 55 manufacturers reported to the U. S. Department of Commerce for the month of June show an increase of 16 per cent over sales for May but are behind June sales of last year by 30 per cent.

Stoker Class	1931 June	1932 June	1932 May	Total 1st. 6 months 1931	Total 1st. 6 months 1932
1	353	312	293*	1,959	1,817
2	76	43	33*	382	218
3	65	14	16*	321	141
4	212	113	71	911	566
Totals	706	482	413	3,573	2,742

*Revised.

Class 1. Capacity less than 100 pounds coal-feed per hour.
Class 2. Capacity 100 to 200 pounds per hour.
Class 3. Capacity 200 to 300 pounds per hour.
Class 4. Capacity over 300 pounds per hour.

◆

Contractor Opens New Shop

The Valley Sheet Metal Co., Neenah, Wisconsin, announces that they have moved into their new and larger quarters. Their new building is built of concrete blocks and contains some 12,000 square feet of floor area.

Offices and a show room will be located at the front of the building right next to the street. The shop will be in the rear. Mr. Stiegler, owner and manager, states that business is slowly increasing and that definite betterment seems certain. Under these conditions he felt, he says, that there will never be a better time to get better quarters than right now.

◆

Demand for New Housing

In a survey covering 358 cities in the United States and Canada, the National Association of Real Estate Boards finds a shortage of single dwellings in 10 per cent of the cities, and a doubling up of families in crowded quarters that promises a great demand for new housing as soon as employment shall provide means. Only 14 per cent of the cities report an oversupply of single dwellings. About 6 percent report a shortage of apartments, and 28 per cent report an over supply. Business property is in the lowest position with 44 percent of the cities reporting excess supply. Mortgage money is in great demand, 88 per cent of the cities reporting would-be borrowers seeking loans.

News Items . . . . . .

Resume Operations in Three Plants

The manufacturing plants of the Richardson & Boynton Company at Buffalo, N. Y., Dover, N. J., and Utica, N. Y. have resumed operations this week after an extended mid-year shutdown.

The reopening of the plants restores to employment hundreds of men in each locality. The company is giving preference in employment to those who were employed at the time of the shut-down.

The company reports that its inventories are very much lower that at the same period in any past year, so that any normal seasonal volume over the balance of the year will undoubtedly mean more days of work per week for all employees.

The general return of confidence in business is being reflected in the company's order books, and a continuance of that trend will mean more than the normal seasonal activity.

◆

Announce New Jobbing Business

The Joseph M. Imfeld Company has been organized at 56 Lindsley Ave., Newark, New Jersey, by Mr. Imfeld who was formerly associated with the Otto Bernz Company which has been bought and moved to Rochester, N. Y.

Mr. Imfeld was connected with the Bernz company for 22 years, serving as manager for 18 years. Tools, equipment and materials equal in quality to the lines manufactured and jobbed by the Bernz company will be assured.

Buy American Goods Campaign

"We're not putting food in the mouths of American Workers nor holding up the wage scale nor helping the unemployed situation in this country by buying goods abroad," was the terse remark made by Samuel S. Fretz, Jr., of Philadelphia, when he made known his plans to inaugurate a campaign with the theme, "BUY Made in America GOODS." Mr. Fretz heads three companies, The S. S. Fretz, Jr., & Co., and the Fretz, Gross & Co., with offices and plants in Philadelphia, Pa., and the Thomas Devlin Mfg. Co., with offices and plants in Burlington, New Jersey.

Incidentally no material used in the manufacturing processes of these three companies is bought abroad—a case of practicing what is being preached.

The campaign promises to have a far-reaching effect in maintaining American working conditions and wages, to relieve general unemployment and to bring business out of its depressed condition back to normal.

To initiate the campaign, a mammoth billboard, 86 by 12 feet has been erected on the plant of Fretz, Gross & Co., facing the Pennsylvania Railroad tracks on which traffic pours between New York and Philadelphia. This board carries the legend, "the duty of EVERYONE—be sure you and your family BUY Made in America GOODS—this will greatly help the unemployed BACK TO WORK."

Three sizes of stickers for display and mail enclosures have been printed. One, 32 by 5½ inches is designed for use in store windows. Another 16 by 3¼ inches is for the rear windows of automobiles. A third printed piece goes out with every piece of mail accompanied by a letter outlining the aims of the campaign, and asks the recipient to co-operate, buying Made in America GOODS.

Reports state that several firms in the Philadelphia district are co-operating and are pushing the idea to the limit.

RIGHT FROM EVERY ANGLE!

• • • the NEW compact insulated Furnace Blower • • •

PRICE

The price is in keeping with the modern tendency. Rather than pay a premium for such salient features as indicated, the price on this NEW Blower is LESS than formerly applied to ordinary furnace fans which lacked many of these features.

COMPACTNESS

All of the essential parts of this blower are located WITHIN the casing. Minimum space is utilized.

QUIETNESS

COMPLETE quietness has been achieved. Motor is rubber mounted and isolated from other parts; trouble-free bearings and fan housing are insulated; casing is made of Celotex, the sound absorbing material.

COMPLETENESS

Blower assembly is complete. Motor, filters, blower and casing are combined in A SINGLE UNIT. Assembling on job unnecessary. Only duct and electrical connections are needed.

ACCESSIBILITY

Large rear panel is easily removed giving access to all parts. Bearings require oil but once a season. Filter cells are standard size and replaceable from dealer's stock.

ATTRACTIVENESS

The Celotex casing is attractively surfaced with pure flake aluminum and trimmed in black. Absolutely waterproof.

WRITE FOR DESCRIPTIVE DATA

The BISHOP & BABCOCK SALES Co.

GENERAL OFFICES: 4901 HAMILTON AVE., CLEVELAND, OHIO

A *New principle of* AIR CONDITIONING!

I KNEW that some day someone would perfect a complete, compact air conditioner as efficient as today's electric refrigerator; one that would assure a steady *unchanging* volume of circulating air. I'm glad it was the Lakeside Company.

After months of scientific testing, rejecting and perfecting we have developed the *FURBLO FAIRWEATHER, a new kind of air conditioner with a combination self-cleaning air filter, *air scrubber* and water eliminator that will not fill up during a heating season and always permits a continuous air flow.

It's a Furblo-quality *complete* air conditioner including all controls and equipment at a moderate price.

It's radically different from anything yet devised for the purpose. We've tested it long enough to be sure it was right. Now that it's ready to go on the market, I'm willing to stake my reputation on its enthusiastic acceptance by those who *know* air conditioning and on its immediate and complete success.

Manager, Lakeside Company

BULLETIN No. 35 TELLS ABOUT IT. WOULD YOU LIKE A COPY?

*PATENT APPLIED FOR

LAKESIDE COMPANY

HERMANSVILLE, MICH.

Makers of Furblo

News Items . . . . . .

Will Exhibit "Seal of Quality" Sheets

Arrangements have been made for exhibits of "Seal of Quality" sheets at the following state fairs and expositions:

Aug. 20-27.—Illinois State Fair, Springfield, Ill., Textile Building.

Sept. 3-10.—Minnesota State Fair, St. Paul, Minn. Space No. 12, Industrial Building No. 3.

Oct. 3-9.—Dairy Cattle Congress, Waterloo, Iowa. Spaces No. 48 and 49, Exhibition Hall No. 3.

Nov. 12-19.—American Royal Livestock Show, Kansas City, Mo. Industrial Exhibit Building.

Previous exhibits this summer have been made at the Annual Meeting of the American Society of Agricultural Engineers, Columbus, Ohio, during the week of June 15, and at the State Farmers Convention, Knoxville, Tennessee, the week of July 25. Announcements covering any additional exhibits will be made at a later date.

◆

Property Repair and Improvement Work Urged

Declaring that potential repair, maintenance, and modernization of home, commercial, and industrial structures in every American community could be made worth "three and a half billion dollars to America's unemployed," Frederick M. Feiker, Director of the Bureau of Foreign and Domestic Commerce, today promised the full cooperation of the National Committee on Reconditioning, Remodeling, and Modernizing in a nation-wide campaign to accomplish that purpose.

"It is to accelerate this movement that the National Committee on Reconditioning, Remodeling, and Modernizing is only too anxious to cooperate with every community interested in promoting repairs and improvements of commercial, home, and industrial structures for the purpose of energizing industry and relieving unemployment," he stated.

"The committee functions are especially vital now," he declared. "One important road to more buying and more employment is through the construction industry. One person in every ten lives by it. Of every dollar spent on improvement and repair, 70 cents goes to local labor, turning each new worker into a customer for other goods and services."

Mr. Feiker pointed out that in the neighborhood of five billion dollars worth of repairs are needed to keep existing structures in good condition. "Of this amount alone," he declared, "approximately three and a half billion would constitute wages for local workers. That means real aid for employment—plus bargain prices for the people who have the work done," he said.

The continual rise in standards for the modern home and commercial building calls for the expenditure of many more billions to bring them up to date. As an indication of how much can be done for little expense today, Mr. Feiker stated that the average repair job can be done for at least 20 per cent less than at any time in the last ten years.

◆

Organize New Shop

Fader Cornice & Roofing Works, Inc., East Orange, N. J., has been organized by Vivian Fader and associates to take over and expand company of same name at 12 Hedden Place, manufacturer of sheet metal products.

News Items . . . . . .

Kester Elects New Sales Manager

Announcement of the election of P. C. Ripley to the office of general sales manager is made by the Kester Solder Company, of Chicago.

Mr. Ripley has been associated with the Kester Solder Company for nearly eight years, having been in charge of industrial sales and product development.

His widespread knowledge of the uses of solder have caused manufacturers to call him into their plants on specific production problems, where he has been of material assistance in successfully solving them with their production executives.

Mr. Ripley is a recognized authority on solder, and has written many articles that have been widely published and quoted. He has also developed many new and valuable ideas, and from these a number of basic solder patents have been issued.

Mr. Ripley states that he believes that there is marked improvement in business conditions and he has noted a definite improvement in sales volumes in the last few months, and he is looking forward to a very satisfactory fall business.

◆

Reports More Optimism

Fred W. Gatter, Sales Manager of McIlvaine Burner Corporation, Evanston, Illinois, has returned to the factory from a three weeks business trip through Wisconsin, Iowa, South Dakota and Minnesota. He reports a more optimistic attitude generally throughout this territory.

◆

New Jobbing Firm Opens in Indianapolis

Two of the best known men in the middle west—Harry R. Jones and Paul R. Jordan—both of Indianapolis, have opened a jobbing business in Indianapolis under the name Jones-Jordan, Inc.

The firm states that it has established excellent sources of supply of manufactured items and will be in a position to furnish all items used by the sheet metal and furnace trades.

A complete line of sheets, including galvanized iron and steel, copper, copper bearing, zinc, and other materials will be carried in stock. A complete line of furnace fittings, downspouts, gutters and accessories, registers, grilles, paints, cement and general supplies will be handled.

The firm's offices and warehouse will be at 631 South Delaware St., Indianapolis.

◆

Men to Be Recalled for Work

The Columbus Furnace Corp., Columbus, Ohio, subsidiary of the Henry L. Doherty Co., and affiliated with Surface Combustion Co., of Toledo, states that their plant is now employing 120 men and has just completed betterments costing $25,000. These betterments will mean the return of more employees.

A BIG SOURCE
of
PROFIT

FROM now until the heating season is over, the AKRON AIR BLAST can be a source of much profit to you.

Make your big effort now and cash in on a single unit which offers 100% air conditioning.

No extras. Easily installed. Backed by a reputation acquired from long service. Highest grade materials and workmanship.

Write today for the story of how you can make air conditioning jobs function at greatest capacity with the AKRON AIR BLAST.

***The* MAY-FIEBEGER Co.**
NEWARK OHIO

AKRON AIR BLAST

New Literature . . . .

Ventilation for Our Trade

For a long time much ventilation work was referred to the electrical contractor because motors and wiring were involved. The sheet metal contractor was usually called in as a last resort to furnish some duct work and a few pieces of metal to complete the job.

This is the basis for a new piece of literature from the Forct-Air Company.

The company is now putting on the market two new ventilators which definitely belong to the sheet metal trade. Sheet metal contractors do not have to worry about wiring or switching as these units are complete in every respect ready to plug in.

The ventilator has a wide range of application from the home to the office and in commercial as well as industrial installations. Among some of these applications are its uses in kitchens, toilets, basements, large and small offices, public garages, storage warehouses, fruit, vegetable and banana rooms, milk plants, small dairies, stables, kennels, hatcheries, boiler rooms also a wide number of industrial uses.

The company has prepared a folder which gives the complete story of the new ventilator. You can get copies from the company.

◆

Architectural Metal Stamping Catalogue

A revised and enlarged addition of the catalogue of architectural metal stampings has been prepared by the Philadelphia Metal Stamping Co., 107 Erie St., Camden, N. J.

The new catalogue brings up to date information on old, revised and new items added to the company's extensive line of stampings. Hundreds of stamped items are shown.

Contractors wanting a copy of this catalogue can secure one by writing to the company.

◆

Revere Issues New Catalog

Following its custom of issuing catalogs semi-annually, Revere Copper and Brass Incorporated has mailed to the trade its July 1st issue.

As usual, the catalog is a completely bound book, with the whole story regarding any one form of product being placed on two facing pages. Buyers will find this very convenient for quick comparison.

The page size has been increased from 7¼"x9" to 8½"x11" which permits of easier reading and filing.

◆

Silent Glow Buys International Burner

The Silent Glow Oil Burner Corp., Hartford, Conn., announces the purchase of the assets and current liabilities of the International Burners Corp., New York City. The International company's factory equipment and executive departments were moved immediately from Newark and New York to Hartford.

The burners manufactured by International-Caloroil, Crescent and Victory will be manufactured under the Caloroil division of Silent Glow. M. J. Binkley, vice-president of International and the sales and engineering departments will be retained intact.

Vernois

BUILD *YOUR* REPUTATION ON *OURS!*

When you install for your customer a furnace from the VERNOIS Line you have positively assured him heating satisfaction derived from a combination of workmanship and materials plus a reputation for consistent performance that has made the VERNOIS Line a leader.

Years of experience in building furnaces have resulted in a furnace which we suggest you stake *your* reputation on. That you cannot go wrong is demonstrated by the success of the VERNOIS Line.

Ease of installation, special construction features and the major point of interest, *economy of operation* promote satisfied customers and build future business for the heating contractor staking his reputation on the VERNOIS Line.

Write for VERNOIS literature. Meet the upturn in business with a *real* furnace value.

MT. VERNON FURNACE & MANUFACTURING COMPANY, MT. VERNON, ILLINOIS

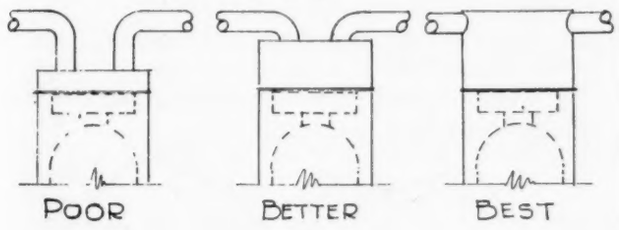
THE "BETTER PRODUCT" LINE

LETTERS from OUR READERS

PLATTE OVERTON'S article on "Bonnets and Plenums" published in the May 9 issue did not meet with 100 per cent approval, several contractors objecting to the Poor-Better-Best solution in Fig 5. Typical of these criticisms is one by B. L. Schwartz, Pittsburgh, who says:

"Platte Overton on 'Inlets and Outlets' as featured in the May 23rd issue of the ARTISAN, is one of his best 'practical' contributions for the great ma-

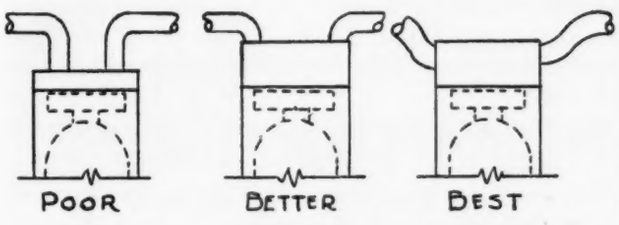
FIG 5



jority of your readers. It contains all the essential meat of the particular subject.

"Mr. Overton's article on 'Bonnets and Plenums' is well written and coincides with my ideas of good practice. The only place I differ with him, is the 'Better' illustration of Fig. 5 (page 26 of May 9th, 1932, issue). We often use this method, but revised to have all collars on the *outside* periphery of the hood. This is shown in the sketch attached.

"Tests made at the University of Illinois, indicate that Fig. 5 (Better) gives a *higher* efficiency than the illustration by Mr. Overton marked 'Best.'



"Another objection to 'Best' is the fact that it throws the hottest part of the bonnet very close to the floor joists. Whereas 'Better' permits maximum pipe clearance with an air space of at least 12 inches between the bonnet and floor joists. The city code in Pittsburgh calls for a minimum clearance of 6 inches; and any clearance less than 12 inches must have a metal shield above it for protection.

"If the same clearance be maintained in 'Best,' it will be necessary to use two angles for each line as shown on the revised sketch attached hereto. It is apparent in this case, that 'Better' is *really* better than 'Best.'"

"And you're Money Ahead with Kester, Ed"

"DO workers *like* to work with Kester Solder? Man . . . *do they!* And no wonder . . . it's so convenient and easy to use. The flux is right there inside the solder. There's nothing to do but apply heat and then go to work. No separate flux to spill or disappear at the wrong time. In about two-thirds of their former soldering time, your men will do three times as good a job! Uniformly perfect results can be counted on *absolutely*. And you know what that means . . . a better reputation . . . and a chance for more and better jobs. More hours of steady work for your helpers, and they won't kick about that either."

There's a Kester Solder for every need . . . Acid-Core, Rosin-Core and Paste-Core. Your jobber sells them all on 1, 5, and 20 lb. spools. Write us for more information.

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Eastern Plant, Newark, New Jersey
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HELP UNEMPLOYMENT
by purchasing U. S. products made by U. S. labor
KESTER SOLDER IS 100% AMERICAN

KESTER FLUX-CORE SOLDER
Acid-Core • Paste-Core • Rosin-Core

easy to use

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COOK HEAT CONTROL CAN BE SOLD ON THAT BASIS. *It not only pays for itself,* but gives greater comfort, convenience and healthful living conditions.

COOK HEAT CONTROL is simply the application of scientific knowledge to the meanest household duty the wife has to perform during the 7 or 8 months of the heating season.

LESS THAN 10% OF THE MILLIONS OF HOMES THAT HEAT WITH COAL HAVE THERMOSTATIC CONTROL

With this Demonstrator Case you can show the prospect the actual operation of Cook Heat Control. You can show what actually happens when the temperature changes two degrees. Show how as much as 50% of their coal or coke is wasted by haphazard manual operation.

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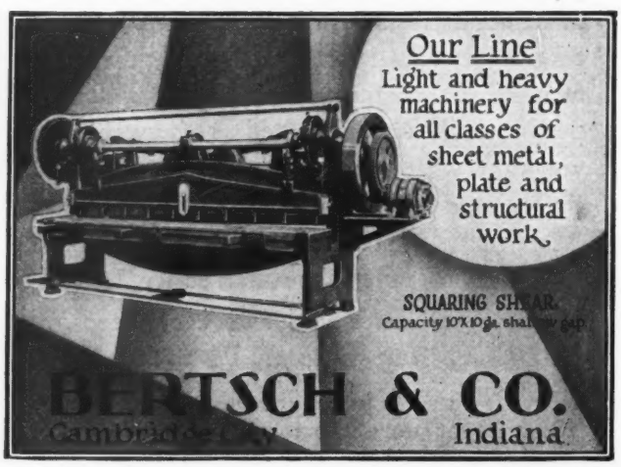
Write today for special merchandising campaign.

1. *SAFETY FEATURE. Closes draft door and opens check door in event of current failure.*
2. *AUTOMATIC FIRING CLUTCH. Closes draft and check doors when firing, and automatically re-engages itself. Nothing to remember.*
3. *Two-year Guarantee.*
4. *Complete merchandising plan.*
5. *Time Payment.*
6. *Substantial profit.*

COOK ELECTRIC CO.
2707 SOUTHPORT AVE., CHICAGO, ILL.
Manufacturers of Heat Control, Limit Control, Relays, Electric Clock Thermostats, Stoker Controls, etc.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Light and heavy machinery for all classes of sheet metal, plate and structural work.
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Capacity 10'X10ga. shal
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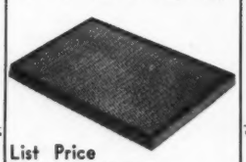
The KLEENAIRE Type "D" Air Filter is the answer to your filtering problem. Not much higher in price than paper carton filters, yet contained in an all-metal case, and is cleanable. Low resistance to air flow makes it adaptable to any heating system. Standard equipment with manufacturers. Write now for complete details.

THE *New* KLEENAIRE FILTER



List Price $2.80 per Unit

KLEENAIRE FILTER CO.
Stevens Point Wisconsin

AMERICAN ARTISAN,

I wish to call attention to a practice which makers of hot air furnaces are following, and which is hurting the furnace business very much. I thought that you might help in calling their attention to this serious defect.

I refer to the practice of placing the water pan in the front cast part of the furnace, just under the feed door. The steam and water that is splashed when filling the pan soon rust the ash pit section, also breaks the fire pot at that point. We have had a lot of complaints and repairs from this cause.

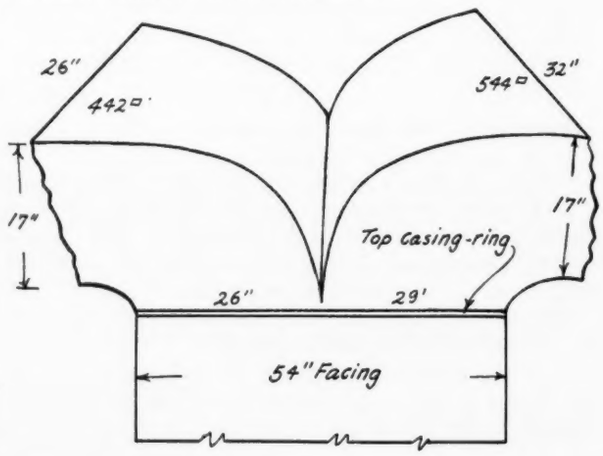
The pan should be located on the side, in the galvanized jacket, same as in the past, then if the jacket rusts out, it can be repaired without great expense, which is not the case when replacing the fire pot or ash pit section.

Respectively,
[Signed] GEORGE E. ROESCH,
Roesch Hardware Co.,
Aurora, Ill.

◆

AMERICAN ARTISAN:

"What 'thermodynamical gymnastics' occur in the enclosed method for two trunks?"



Answer—

This question no doubt refers to the article Bonnets and Plenums in the May 23 issue of the AMERICAN ARTISAN.

The total area of the two trunk ducts is 6.85 square feet and at 1750 c. f. m. the velocity would be $1750 \div 6.85 = 256$ feet per minute. This can hardly be termed a pressure or mechanical installation as such velocities are possible for a gravity installation.

The free area in the 54-inch casing is not given, but assuming that it has 50% free area the velocity over the castings and through the air passages will not exceed 220 feet per minute. Any "Thermodynamical Gymnastics" would depend on the lengths of the trunk lines, volume dampers, distance of the inlets from the heater, etc.

As the installation is basically a gravity system regardless of the blower installed, any discussion would require more information.

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Furnishing stove, furnace and boiler replacement parts is the ONE AND ONLY job of the Des Moines Stove Repair Company. We have been at this job for 63 years. Consequently, "Des Moines" repairs are MADE TO FIT. They are guaranteed against defects.

Because we carry made-up parts and patterns for practically EVERY furnace, stove or boiler used in the Central West, our service means *prompt delivery* on all orders. In fact, 9 out of every 10 orders are shipped the same day we receive them.

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THE MARSHALLTOWN LINE

No. 18

SHEARS THAT CUT

That's what you're looking for—shears that will save money for you—shears that stand the gaff.

Install at least one type of Marshalltown throatless shears in your shop. Do it now!

SHEARS FOR EVERY JOB: CUTTING CAPACITY UP TO ½".

The MARSHALLTOWN line is complete—a shear for every use.

THE CATALOGUE TELLS THE STORY—WRITE FOR IT

SPECIFICATIONS

CAPACITY—
18 gauge and lighter—1¾" radius.

CUTTERS—
2"x1½"—high grade tool steel. Slightly knurled to feed material.

ADJUSTMENT—
One bolt. Instructions furnished.

SIZE AND MATERIAL—
Height 19½"; head cast steel; base cast iron; gears steel and cast iron. Shipping weight 45 lbs.

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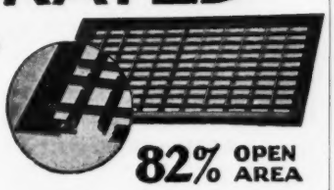

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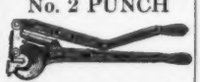
WHITNEY Lever Punches

No. 1 PUNCH

Length, 34 inches. Capacity ⅜-inch hole through ¼-inch iron. Punches and dies in sizes from ⅛ to ⅜ by 64ths.

No. 2 PUNCH

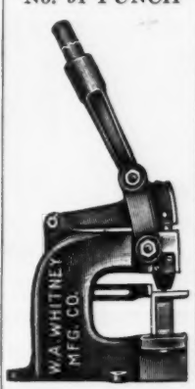


Length, 23 inches. Capacity ⅜-inch hole through ¼-inch iron. Punches and dies in sizes, ⅜-inch to ½-inch by 64ths.

CHANNEL IRON PUNCH

Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity, ¼-inch hole through ¼-inch iron.

No. 91 PUNCH



Capacity — ⅝-inch hole through ¼-inch, 1-inch hole through ⅞-inch and 2-inch hole through ⅛-inch iron. Depth throat 5-inches. Weight 82 lbs.

We have tools for every purpose needed by Sheet Metal Contractors.

Ask your Jobber

No. 4B PUNCH

Length—8½ inches. Capacity—¼-inch through 16 gauge. Deep Throat —2 inches. Weight—3 pounds. Punches and Dies—⅛" to ⅜" by 64ths.

No. 6 PUNCH

Length—26½ inches. Capacity ¼-inch hole through ⅛-inch iron; especially adapted for button punching or templet work.

W. A. WHITNEY MFG. COMPANY

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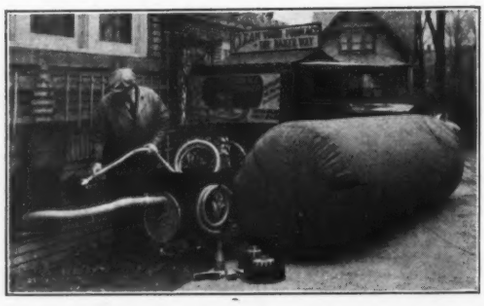
With a Baker Furnace Cleaner

Place your ad on the big 15' x 4' bag. The psychological effect on the customer with this machine and big bag is perfect. There are prospects all around you. The most profitable way to take advantage of this business is the Baker Way. Write for details about trial offer and how to get the orders.

BAKER FURNACE CO., 2507 Albion St., Toledo, Ohio



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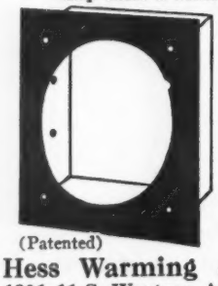
THE PEERLESS FOUNDRY *COMPANY*
INDIANAPOLIS INDIANA

Use the NEW Hesco Smoke Pipe Connector on Every Job

For smoke pipe to chimney connection. It will help make a better job and help you to sell more furnaces.



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Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

AIR CONDITIONERS
(See Unit Air Conditioners)

AIR WASHERS
Gehri & Co., Inc., A., Tacoma, Wash.
Health Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.

BLAST GATES
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Gehri & Co., Inc., A., Tacoma, Wash.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.

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Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRAKES—CORNICE
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

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Revere Copper and Brass, Inc., Rome, N. Y.

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Peerless Foundry Co., Inc., Indianapolis, Ind.

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Fanner Mfg. Company, Cleveland, Ohio

CEILINGS—METAL
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Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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Northwestern Stove Repair Co., Chicago.

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Russell Mfg. Co., Inc., The John M., Naugatuck, Conn.

CHAPLETS
Fanner Mfg. Company, Cleveland, Ohio

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Breuer Elec. Mfg. Co., Chicago, Ill.
National Super Service Co., Toledo, Ohio
Northwestern Stove Repair Co., Chicago.
Ramey Mfg. Co., The, Columbus, Ohio.

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Brown Wales Co., Boston, Mass.
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Brown Wales Co., Boston, Mass.
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Interstate Machinery Co., Chicago, Ill.

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Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

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Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Parker-Kalon Corp., New York, N. Y.
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Lakeside Co., Hermansville, Mich.
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Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

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Interstate Machinery Co., Chicago, Ill.

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(See Cleaners—Furnace Vacuum)

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Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Company, Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.

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Forest City Foundries Co., Cleveland, Ohio

FURNACES, GAS SOLDERING

Interstate Machinery Co., Chicago.

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Motor Wheel Corp., Heater Div., Lansing, Mich.
Peerless Foundry Co., Indianapolis, Ind.

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(See Also Unit Air Conditioners)

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Andes Range & Furnace Corp., Geneva, N. Y.
Deshler Foundry & Machine Works, Deshler, Ohio
Forest City Foundries Co., Cleveland, Ohio
Fox Furnace Co., The, Elyria, Ohio.
Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Co., The, Peoria, Illinois
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
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Meyer & Bro. Co., F., Peoria, Ill.
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Peerless Foundry Co., Indianapolis, Ind.

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Automatic Humidifier Sales Co., Detroit, Mich.
Clarm Mechanical Devices Co., Lima, Ohio
Columbus Humidifier Co., Columbus, Ohio.
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3¼
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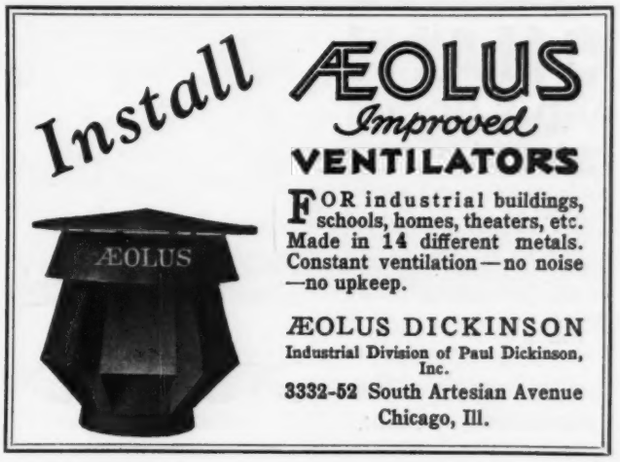

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That's why daily more manufacturers are adopting SIMPLEX as the standard humidifier. It will pay you to investigate.
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Truly Automatic—

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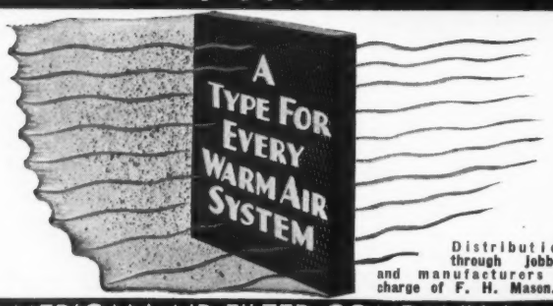

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AND S-HOOKS

For furnace damper regulators, thermostats, furnace clocks, skylights and ventilators. Put up 250, 500 or 1,000 feet to the reel, or in boxes to desired length. Furnished, if desired, coppered, sheradized or hot galvanized to prevent rusting.

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Single Jack Chain

Safety Chain

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The TORNADO
Furnace Cleaner

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

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865 Blackhawk Street, Chicago, Ill.

BUYERS' GUIDE

PRESSES
Dries & Krump Mfg. Co., Chicago, Ill.

PULLEYS—FURNACE
Hart & Cooley Mfg. Co., Chicago, Ill.

PUNCHES
Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

PUNCHES—COMBINATION BENCH AND HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

PUNCHES—HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

RADIATOR CABINETS
Hart & Cooley Mfg. Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Revere Copper & Brass, Inc., New York City.

REGISTERS
Forest City Foundries Co., Cleveland, Ohio.
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Peerless Foundry Co., Indianapolis, Ind.

REGISTERS—WOOD
Auer Register Co., Cleveland, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

REGULATORS AND LOCKS, VOLUME DAMPER
Young Ventilating Co., The, Cleveland, O.

REGULATORS—AUTOMATIC HEAT
Cook Electric Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

REPAIRS—STOVE AND FURNACE
Brauer Supply Co., A. G., St. Louis, Mo.
Des Moines Stove Repair Co., Des Moines, Iowa.
National Foundry & Furnace Co., Dayton, Ohio.
Northwestern Stove Repair Co., Chicago, Ill.
Peerless Foundry Co., Indianapolis, Ind.

RIDGING
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

RINGS—FURNACE CASING
Forest City Foundries Co., Cleveland, Ohio.

ROOF FLASHING
Barnes Metal Products Co., Chicago, Ill.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

ROOFING—IRON AND STEEL
American Rolling Mill Co., Middletown, Ohio.
Barnes Metal Products Co., Chicago, Ill.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

ROOFING—TIN AND TERNE
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

RUBBISH BURNERS
Hart & Cooley Mfg. Co., Chicago, Ill.

SCREWS—HARDENED METALLIC DRIVE
Interstate Machinery Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Parker-Kalon Corp., New York City.

SCREWS—HARDENED SELF TAPPING SHEET METAL
Interstate Machinery Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Parker-Kalon Corp., New York City.

SCREENS—PERFORATED METAL
Harrington & King Perforating Co., Chicago, Ill.

SCUPPERS
Aeolus Dickinson, Chicago, Ill.

SHEARS—HAND AND POWER
Dries & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Viking Shear Company, Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill

SHEET METAL SCREWS—HARDENED, SELF-TAPPING
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York City.

SHEETS—ALLOY
Inland Steel Company, Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—BLACK, CORRUGATED, GALVANIZED
American Rolling Mill Co., Middletown, Ohio.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER
American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—COPPER BEARING STEEL
American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill
Inland Steel Co., Chicago, Ill.

BUYERS' GUIDE

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Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER (LEAD COATED)

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—IRON

American Rolling Mill Co., Middletown, O.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—MONEL METAL

International Nickel Co., New York.

SHEETS—NICKEL

International Nickel Co., New York.

SHEETS—PURE IRON COPPER ALLOY

Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.

SHEETS—REFINED OPEN HEARTH IRON

American Rolling Mill Co., Middletown, O.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—SPECIAL FINISH

American Rolling Mill Co., Middletown, O.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS, STAINLESS STEEL

Brown Wales Co., Boston, Mass.
Republic Steel Corp., Youngstown, Ohio.

SHINGLES AND TILE—METAL

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SKYLIGHTS

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SNOW GUARDS

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SOLDER

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Kester Solder Co., Chicago, Ill.
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SOLDER—ACID CORE

Kester Solder Co., Chicago, Ill.

SOLDER—ROSIN CORE

Kester Solder Co., Chicago, Ill.

SOLDER—SELF-FLUXING

Kester Solder Co., Chicago, Ill.

STARS—HARD IRON CLEANING

Fanner Mfg. Company, Cleveland, Ohio.

STOVE PIPE AND FITTINGS

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

STOVE AND FURNACE TRIMMINGS

Fanner Mfg. Co., Cleveland, Ohio.

STRAINERS—ROOF

Barnes Metal Products Co., Chicago, Ill.

STRAPS—ORNAMENTAL PIPE

Barnes Metal Products Co., Chicago, Ill.

TINPLATE

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Henry Furnace & Fdry. Co., Cleveland, O.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Lennox Furnace Co., Marshalltown, Iowa.
May-Fiebeger Company, Newark, Ohio.
Meyer Furnace Co., Peoria, Ill.
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Payne Furnace & Supply Co., Beverly Hills, Calif.

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Aeolus Dickinson, Chicago, Ill.

VENTILATORS—ROOF

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Berger Bros. Co., Philadelphia, Pa.
Jordan & Co., Paul R., Indianapolis, Ind.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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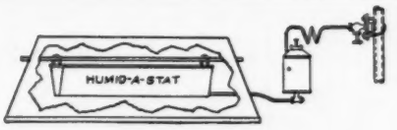
Interstate Machinery Co., Chicago.

WOOD FACES—WARM AIR

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.



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This is the time of the year when you can talk Humid-A-Stats and have good listeners. You can make homes livable with the Clarm Humid-A-Stat, by an installation that is accomplished in less than one hour's time. That feature itself will sell the Humid-A-Stat, but the clinching feature is the low price. Write now for full details.

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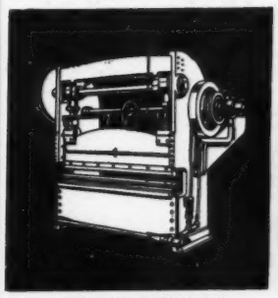

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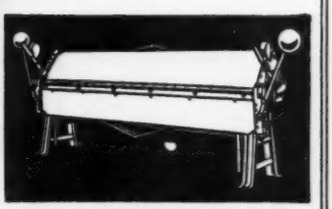

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Steel Brakes—Presses—Shears
DREIS & KRUMP MFG CO.
7404 LOOMIS BLVD. CHICAGO

WIRE DROP HANDLES
for
FURNACE DOORS

Furnished Nickel Plated in Following Lengths:
2⅝" - 3⅛" - 3⅜" - 4½" - 5½"
We also manufacture a complete line of Furnace and Stove Trimmings—such as Pokers, Lifters, Scrapers, Shovels, Cranks, Shakers, Lever Handles, Turnkeys, Knobs, Air Mixers, Register Screws, Gas Stove Fittings, Valve Wheels, Furnace Regulators, etc. *Write for Samples and Prices.*
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BROOKSIDE PARK - - CLEVELAND, OHIO

Write for full information and our catalog.

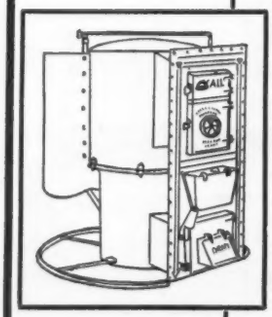
There is profitable business ahead of you in the next few months in heat boosters. Go after this business with the

A-C Thermostatically Controlled *Automatic* HEAT BOOSTER

A-C MANUFACTURING CO.
417 Sherman Ave. Pontiac, Ill.

The X-L-ALL is the BEST Warm Air Furnace!

You needn't take our word for it. We offer the opinion of the actual users. While everyone is quick to appreciate the advantages of the oversize combustion chamber, increased direct heating surface, and numerous other features, the best proof of the superiority of the X-L-All is available in our interesting booklet and copies of unsolicited endorsements which we will gladly send you on request. Write today. No obligation.



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A Complete Line *of* Parts *at factory prices*

We can ship promptly, parts for the following furnaces:

Acorn	Garland	Leeson	Remoh
Ajax	Gem	Marshall	Rudy
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Berry	Harmon	Michigan	Sunbeam
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Carton	Hero	Monitor	Titan
Comfort	Homer	Mueller	Victory
Empire	Ideal	Niagara	Wayne
Eureka	International	Ottawa	Weir
Faultless	Jewel	Peninsular	Welcome
Favorite	Kalamazoo	Perfect	Williamson
Floral City	Kernan	Premier	Wolverine, and
Follansbee	Lackawanna	Princess	All Others
Fox	Laurel	Progressive	

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Parts for all makes of Furnaces and Steam Boilers
7516-22 OAKLAND AVE., DETROIT, MICH.

Boiler Parts.

American	Winchester	Ideal—All Types	Pebco	Richardson
Arco	Continental	Imperial	Pierce	Royal
Arcola	Floral City	Mueller	Radiant	Vecto
Capitol-Solar				And All Others

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SHEET METAL BUILDINGS!

Sheet Metal Buildings is not an overnight movement but one that has been taking shape for some time. The publicity that this movement is getting is resulting in a volume of incidental sheet metal work that is creating profits for the sheet metal worker. And in this connection The Viking Portable Bench Shear should be part of your equipment on the job if you are to take complete advantage of every profit possibility.

★

The VIKING *Shear*

VIKING SHEAR CO.
ERIE PA.

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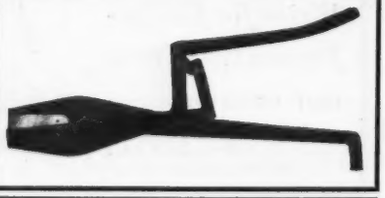
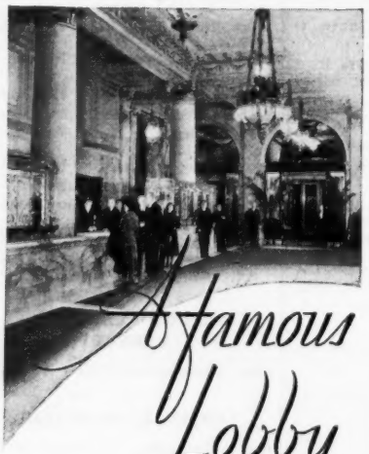
SEND FOR FULL PARTICULARS





A famous Lobby

ITS register reads like a "Who's Who" of world leaders in commerce, finance, diplomacy, the arts, and social life. The last eight Presidents of the United States have always stopped at the Bellevue-Stratford.

YOU will enjoy its fine hospitality and faultless efficiency—at rates that are quite consistent with present times.

BELLEVUE STRATFORD
PHILADELPHIA
CLAUDE H. BENNETT, *Gen. Mgr.*

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SALESMEN CALLING ON FURNACE manufacturers and jobbers will establish a permanent income by selling METALUTE, the all iron furnace cement which is proving superior to the old style mud cements. COLORBESTOS Furnace Paint Insulation. INSALUTE (Liquid Porcelain) which is used by hundreds of installers for double sealing leaky furnaces without tearing them down, and KNO-LEAK Pipe Dope Compound, approved by Medical Societies because it is free from poisonous white lead. TECHNICAL PRODUCTS CO., Pittsburgh (15) Penna.

DESIGNER WANTED—AN OLD, ESTABlished, well-known stove company wants a successful designer with years of experience. State age, complete experience and any references. Address Key 181, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

REPRESENTATIVES WANTED TO CONtact heating dealers with our new thermostatically controlled, forced air (blower) coal burner, selling at the remarkably low price of $29.75. Burns low cost fuel. A depression item which will absolutely replace oil burner and damper regulator sales this season. Give details. Address Universal Blower Co., Birmingham, Michigan.

WANTED—SHEET METAL AND ROOFing estimator and salesman. Must be thoroughly experienced in the industry. Address Key 173, "American Artisan," 1900 Prairie Avenue, Chicago.

SITUATIONS WANTED

SITUATION WANTED—SHEET METAL worker desires connection, preferably Illinois. Experienced in all lines of sheet metal work. 34 years old. Regular habits. Address Key 176, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

EXPERIENCED SHEET METAL SALESman wants position representing responsible manufacturer in the state of Iowa. Address Key 177, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

CORRESPONDENCE SOLICITED WITH manufacturer developing or producing air conditioning units, or with furnace, sheet metal contractor who desires the services of a reliable man. 20 years' practical experience in engineering, estimating and sales. Address Key 180, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

WANTED—JOB BY COMPETENT COMbination plumber and tinner, 16 years' experience, full particulars in future correspondence. Address H. W. Chambers, Shellrock, Iowa.

EXPERIENCED FURNACE SALESMAN would like position representing responsible manufacturer in Wisconsin. Address Key 172, "American Artisan," 1900 Prairie Avenue, Chicago.

WOULD LIKE TO HEAR FROM SOMEone who needs a good reliable radiator man and tinner. Will go anywhere. Address J. D. Jacimore, East Main Street, Russellville, Arkansas.

SITUATION WANTED BY FIRST CLASS sheet metal worker. Would like to connect with some concern doing work all over the country. Sober, steady and reliable and good habits. Will stick to the concern I connect with. Address Key 168, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—PLUMBER, heating and sheet metal man, wants good position, married. Can go to work at once. Address H. C. Hughes, Forest City, Iowa.

MARRIED MAN, SOBER AND REliable, who has had twenty years' experience in hardware, can do plumbing, heating and tinning expertly, desires a position with hardware concern in need of an all around man. Can furnish character and qualification references. Address Key 169, "American Artisan," 1900 Prairie Avenue, Chicago.

SITUATION WANTED—ALL AROUND sheet metal worker and furnace man. Prefer Wisconsin, Michigan or Illinois. Available immediately. Address Key 167, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

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ONE-THIRD INTEREST IN GOOD sheet metal and retinning business. Sale forced by death. Address Mrs. C. A. Martin, Bywater & Groo Co., 144 West South Temple, Salt Lake City, Utah.

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District Sales Representatives

To salesmen of proven ability we offer a commission proposition in a few attractive territories. Trade paper advertising starts August issues. Write at once for details. Automatic Humidifier Sales Co., 6560 Cass Avenue, Detroit, Michigan.

WANTED TO BUY

WANTED—USED CROSS LOCK SEAMER. Address Julius Hauser & Son, 817 North Fulton Ave., Evansville, Indiana.

WANTED—ONE SET OF 40" OR 42" forming rolls. Must be in first class condition and a bargain. Address Key 171, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE

FOR SALE—RADIATOR AND WELDING shop in one of the best towns of 8,000 population in Arkansas at bargain. Address Key 174, "American Artisan," 1900 Prairie Avenue, Chicago.

AIR-O-VAC FURNACE CLEANER WITH tools. New condition. Cost $350.00. First check for half takes it. Write No. 2101 East Wood Place, Milwaukee, Wis.

FOR SALE—FURNACE AND SHEET metal shop. Price is reasonable. Write for further particulars. Address W. A. Halbleib, Marengo, Illinois.

FOR SALE—OLD ESTABLISHED TIN shop in town of 800 in central Illinois. German community. Death reason for selling. Will sell all or part; no reasonable offer refused. Address Eugene Moyemont, Odell, Illinois.

FOR SALE—FURNACE AND SHEET metal business in town of North East, Erie County, Pennsylvania. Population of town about 3,500; a prosperous community. Business well established. Stock and tools for sale cheap. Reason for selling—poor health. Address Eldon Denton, North East, Erie County, Pennsylvania.

FOR SALE—1 45-IN. FAIRCHILDS folder, $7.00; 1 20-in. bar folder, $7.00; 1 large P. S. burring machine, less handle and stand, $4.00; 1 setting down machine, less stand, P. S., $5.00. All of the same are in fair shape and can be used. Address Key 178, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

FOR SALE—OFFICE FIXTURES, INcluding safe, adding machine, cash registers, and Uarco business system, also some tinners' tools. Address Jas. B. Crowley, Oelwein, Iowa.

FOR SALE—ONE No. 2 RYERSON serpentine shear, Belt Driven. Capacity of cutting 10 ga. material. $125.00. Slightly used. Address E. A. Knabe, Rock Falls, Illinois.

FOR SALE—COMPLETE HARDWARE and sheet metal business in a town of 15,000 in Northern Illinois. Doing all sheet metal and maintenance for several large factories, also the agency of the Timken Silent Automatic Oil Burner and MW hot water heater of which we have a large business built up. A good business for some sheet metal and hardware man who wants to get out of the large city. Address Key 174, "American Artisan," 1900 Prairie Avenue, Chicago.

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Barrister Bldg., Washington, D. C.

SHEET METAL MACHINERY
COMPLETE STOCKS—NEW—USED—HAND OR POWER

Rebuilt Bargains

30"x2 Plain Roll	$10.00
30" Wrights Pipe Folder	10.00
Hollow Mandrell Stake	4.50
32" Pexto Square Shear, Complete	35.00
10'—10 ga. Power Press Brake, Motor Drive	
10'—3/16" Power Square Shear	
100 Used Bench Machines and Stakes at Fraction of Cost	

SEND FOR BULLETIN C-2
"INTERSTATE HAS IT"

Rolls—Shears—Brakes
Press Brakes—Spot Welders
Folders—Drills—Punch Presses

WE BUY—SELL—EXCHANGE

INTERSTATE MACHINERY CO.
130 S. CLINTON ST., CHICAGO

"E-Z FIT" EAVES TROUGH
Bead is cut back, making it easy to put gutter together. Requires no soldering—not affected by expansion or contraction.
Write for Catalogue. Order from your Jobber.

"BB" The mark of quality
Eaves Trough . Gutter Hangers . Conductor Pipe
Conductor Fasteners . Mitres . End Pieces and Caps
Conductor Heads . Ornamental Straps . Ventilators, etc.
BERGER BROTHERS CO.
229-237 Arch Street, Philadelphia, Pa.

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HERE! AT BROWN WALES CO.

Armco Ingot Iron
Galvanized Steel
Even Color Sheets
Roofing Sheets
Copper and Zinc
Stainless Sheets
Paint Grip Sheets
Conductor Fittings
Tin
Solder
Tools

YOU'LL FIND THE PRODUCTS YOU NEED
THE WAY YOU WANT THEM

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MONEL METAL JOBS
BUILD
PROFITABLE BUSINESS

● Demand for Monel Metal equipment is constantly growing. In every community there are homes, schools, restaurants or factories offering a good market for many different kinds of Monel Metal jobs.

Hundreds of sheet metal firms are making money on Monel Metal equipment...and there's no reason why you should not do the same. Read the experiences of the successful firms featured in our "True Talks" series which appears regularly in this magazine...also write us for helpful sales literature.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET, NEW YORK, N. Y.

A HIGH NICKEL ALLOY
MONEL METAL
NICKEL ALLOYS PERFORM BETTER LONGER

MONEL METAL

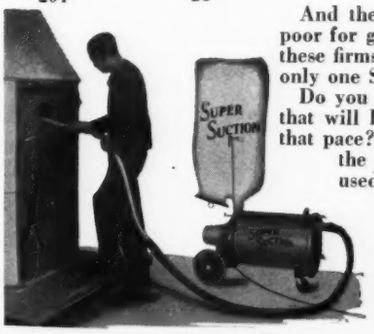
Monel Metal is a registered trade mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

Does FURNACE CLEANING Really Pay?

These men say it does pay them, with their strong, handy, quick, one-man machines.

Cleanings paid them well, plus all these good sales:

CLEANINGS	NEW PLANTS	REPAIR PARTS	OVERHAULS
100	12	...	...
304	7	87	26
800	5	500	40
651	42	175	200
204	21	62	15



The new model; lighter, more compact; same husky motor, ½ H. P. plus; suction 60% more; new style big bag; suit-case bag, clean, for upstairs, extra; full line of tools; prices lower.
With A tools.....$131
With B tools..... 151

And these in a year which was poor for general business. Each of these firms, names on request, used only one Super Suction.

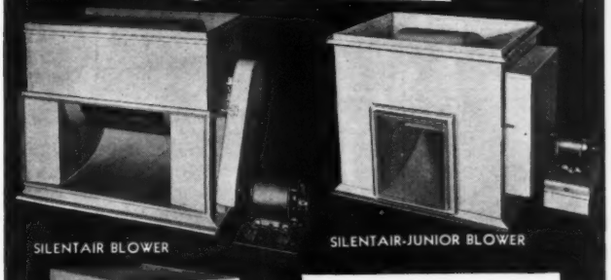
Do you know of any other thing that will bring in new business at that pace? Would you like to see the Plan Book which they used? It is free, and shows how they got these sales. Do you know how you can first try this good Super Suction before you decide to keep it? And then to let it pay for itself? Easy.

Send this clipping with your name and address on it, to

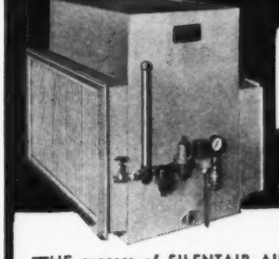
The NATIONAL SUPER SERVICE CO.
1944 NORTH 13th STREET TOLEDO, OHIO

THE MOST COMPLETE LINE OF AIR CONDITIONING UNITS IN AMERICA

SILENTAIR



MATCHED UNITS
TANDEM & VERTICAL
COMBINATIONS



THE success of SILENTAIR AIR CONDITIONING UNITS results in no small measure from the fact that they are MATCHED UNITS — properly designed — fully equipped — guaranteed ratings; easily installed with any warm air furnace. They bring splendid profits to dealers, and comfort and economy to home owners. Write for descriptive literature.

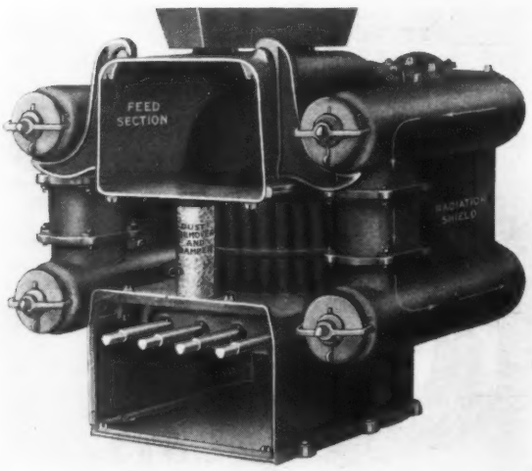
Built Up to a Standard—Not Down to a Price

A. GEHRI & CO. Inc.

Tacoma, Washington
1117 S. Tacoma Ave.

Syracuse, N. Y.
400 N. Midler Ave.

ANDES "BRN" SUPER HEATER
for
AIR CONDITIONING JOBS



The Andes "BRN" Super Heater warms, ventilates, humidifies, purifies and refreshes the home. It offers the dealer a real unit and an opportunity to supply air conditioning for homes at a reasonable price.

Super construction, as well as unusual design makes Andes Furnaces leaders and assists in bringing the dealer to the front. Investigate our dealer proposition and unlimited merchandising cooperation.

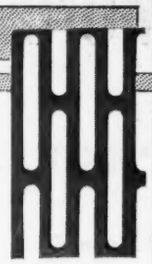
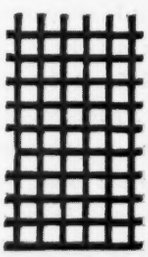
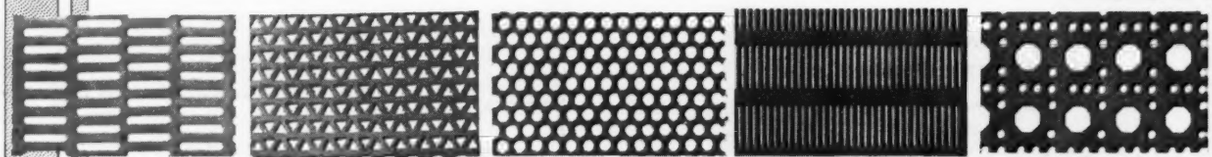
ANDES RANGE & FURNACE CORP.
GENEVA NEW YORK

The Andes "BRN" Super Heater constructed for the lowest type basements.

ANDES FURNACES
"for better heating"

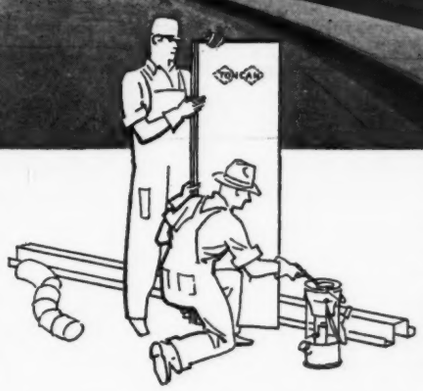
Perforated Metals
for every requirement

Steel, Brass, Bronze, Copper, Monel
Aluminum, Stainless Iron, Zinc
or any other metal
PERFORATED TO YOUR ORDER
Round holes from .020" to 7" Diam.
Oblong and Slot holes from .008" to 3" wide.
Grilles of distinction for fine buildings
Everything in Perforated Metal

THE HARRINGTON & KING PERFORATING CO.
5649 FILLMORE ST., CHICAGO, ILL., U. S. A. NEW YORK OFFICE, 114 LIBERTY ST.

THE MERITS OF TONCAN IRON PENETRATE PRISON WALLS



When the last addition was made to the cotton mill of the Federal Penitentiary, Atlanta, Georgia, almost two tons of Toncan Iron sheets were used in conveyor ducts and flues in the picker and opening departments.

Toncan Iron was selected on its merits—its resistance to rust—its longer life—its workability. The installation was made by the Atlanta Sheet Metal Works under the direction of the engineers, Robert & Company, also of Atlanta.

The applications of Toncan Copper Molybdenum Iron are unlimited. Wherever ordinary sheet metal can be used, Toncan Iron should be given consideration. Its advantages always offset its slightly higher cost—and the ease with which it can be worked often saves enough time in the forming that it costs the buyer no more, yet shows a profit to the contractor—in both dollars and good will.

Ask for a copy of "The Path to Permanence" showing hundreds of actual uses. It will give you ideas for your own business, and ideas today mean dollars tomorrow.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

REG U.S. PAT. OFF.
TONCAN
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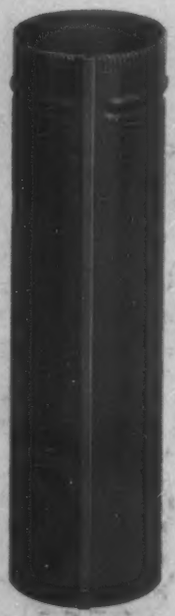
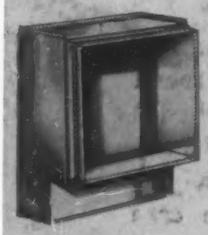
IRON

STOVE PIPE ELBOWS



STOVE PIPE



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At the top of this page is the *new Milcor General Feeding Trough*—one of a complete line of stock troughs and feeding pans. Milcor troughs are superior in many ways—yet they cost no more. If you are not acquainted with these new Milcor products, write for more information.

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Watch for New September, 1932, Prices!

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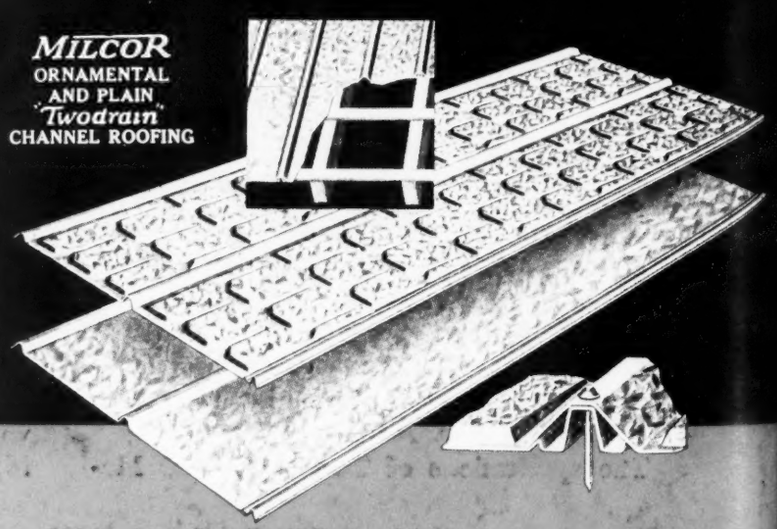

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